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ABSTRACT

A total of 105 children (3, 4, and 5 years old) participated in a study to determine the extent to which the experience of attending a mobile classroom for an hour and a half, once a week (32 weeks) contributed to the development of social skills. Since this was one of the first attempts to measure these skills in young children, another objective was to learn as much as possible about the development of these skills. The children were divided into two groups. One watched the daily television program, "Around the Bend," and was visited weekly by a home visitor. The other group watched the program, had home visits and visited a mobile classroom once a week. A task which involved placing model furniture in a model house was selected as the task which would most stimulate the occurrence of behaviors that facilitate the process of learning in group situations. Observers coded children's behavior under six major categories: initiation, request for help or questions, giving help, refusing help, group consciousness, and response to peers. Results gave strong indication that the mobile classroom contributed to the development of social skills assumed important in the learning process within a socially structured environment. Tables and graphs comprise more than half the document. A summary of AEL Early Childhood Education program is available as PS 004 889. (Author/AJ)

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SOCIAL SKILLS DEVELOPMENT IN THE EARLY CHILDHOOD EDUCATION PROJECT

Technical Report No. 7

Division of Research and Evaluation
Appalachia Educational Laboratory
Charleston, West Virginia

February, 1971

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SOCIAL SKILLS DEVELOPMENT IN THE EARLY CHILDHOOD EDUCATION PROJECT*

One assumption underlying the objectives of the AEL Early Childhood Education Program is that there are certain social skills--like asking a question, responding to peer, initiating statements, etc.--which should be an integral part of early childhood education. One purpose for encouraging the children to visit a mobile classroom once each week was to facilitate the development of these social skills.

This year it became feasible to make a preliminary attempt to measure social skills in two of the groups of children in the Early Childhood Education project: one group which watched the daily television program and is visited weekly by home visitors (TV-HV) and another group which visited a mobile classroom once a week in addition to watching the daily television program and being visited by paraprofessionals (Package). A unique contribution of the mobile classroom in this project was the opportunity it provided for children to learn from other children in an educationally provocative environment. It is hypothesized that exposure to the mobile classroom would result in the development of social skills important to learning in addition to cognitive development acquired by those children exposed only to the television program and home visitations by paraprofessionals.

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*The Social Skills study was completed by Dr. Deagelia Pena of the Research and Evaluation Division and Dr. George Miller who is responsible for formative evaluation within the Early Childhood Education Program.

Research Design

The Task

It became evident from observing children in kindergartens and nursery schools that social skills were most important when small groups of students were working on a task with little or no teacher involvement. Hence, it was necessary to devise a standardized situation in which children would have an opportunity to demonstrate these skills. Among several tasks which were field tested, the task which involved placing model furniture in a model house was selected as the task which would most stimulate the occurrence of behaviors that facilitate the process of learning in group situations.

The Sample

The primary purpose of this study was to determine the extent to which the experience of attending a mobile classroom for an hour and a half, once a week for 32 weeks contributed to the development of social skills. In addition, because this effort represented one of the first attempts to measure these skills in young children, an objective was to learn as much as possible about the development of these skills. Therefore, the following conditions were imposed on the sampling.

1. There would be four members in each group unless members withdrew and could not be replaced. In that event, the group would still be used providing there were at least two members present.

2. The members of each group would be strangers to each other to eliminate variance resulting from different degrees of friendship.

3. The members of a particular group would be the same age.

4. At each of the three age levels in each group (those attending and not attending the mobile classroom) there would be two all male groups, two all female groups and two mixed groups consisting of two males and two females.

5. The subjects would be selected randomly from each home visitor's list of project participants according to the availability of the home visitor to provide transportation and the needs of the schedule.

ATTACHMENT 7-1 shows a graphical representation of the original design for 144 subjects.

The Experimental Design

ATTACHMENT 7-2 shows the mixed model for an analysis of variance, intended for this study. However, some of the children were absent from the video tape sessions due to sickness or other reasons. This left 105 subjects with unequal number in each group. The alternative model used was a 2x3x3 factorial design for unequal n's within the cell--the group factor removed.

A replication of this study in the spring of 1971 may possibly make use of the original design in ATTACHMENT 7 -2 or a modification of it which will leave the group factor in, so that the variance due to the group can be accounted for.

The Coding

The variables were derived from a systematic observation of behavior. In developing a category system for such observation the considerations were that information regarding the more important social skills would be provided; that all behavior would be accounted for in mutually exclusive categories; and that the children's behavior could be coded with a high degree of reliability.

The observational system consisted of 28 categories of social skills. These are listed in TABLE 7-1. These 28 categories fall under six major classifications--initiation, question or request for help, giving help, refusing help, group consciousness, and response to peer.

TABLE 7-1

SOCIAL SKILLS CATEGORIES: AN OBSERVATIONAL SYSTEM

Code No.	Category
Initiation	
11	Initiates constructive or neutral statement: a statement that does not impede the completion of the task or interaction between group members. Declarative statements to the teacher; verbal enthusiasm.
12	Initiates non-verbal constructive or neutral action to peer; shows or gives an object to peer.
13	Initiates antagonistic statement.
14	Initiates antagonistic action.
15	Interrupts peer(s).
Question or Request for Help	
21	Asks a question of peer.
22	Requests assistance verbally of peer.
23	Requests assistance non-verbally of peer.
24	Asks a verbal or non-verbal question of the teacher.
25	Listens to the teacher or responds to teacher's question.
Giving Help	
31	Gives help on own initiative or in response to categories 22, 23 or as needed. This is non-verbal.
32	Gives help on own initiative when not needed. This is non-verbal.
Refusing Help	
41	Refuses request for assistance with good reason-verbally or non-verbally.
42	Refuses a reasonable request of assistance--verbally or non-verbally.

TABLE 7-1 (Cont'd)

Code No.	Category
Group Consciousness	
51	Shows non-verbal enthusiasm.
52	Participates quietly with group on task.
53	Withdraws from group and works alone.
54	Does not work on the project whether alone or with group; watches others, bored, etc.
55	Withdraws for security.
56	Gets distracted by microphone, camera, lights, etc.
Response to Peer	
61	A non-antagonistic verbal response to a non-antagonistic peer statement/action.
71	A non-antagonistic non-verbal response to a non-antagonistic peer statement/action (listening).
62	A non-antagonistic verbal response to an antagonistic peer statement/action.
72	A non-antagonistic non-verbal response to an antagonistic peer statement/action.
63	An antagonistic verbal response to an antagonistic peer statement/action.
73	An antagonistic non-verbal response to an antagonistic peer statement/action.
64	An antagonistic verbal response to a non-antagonistic peer statement/action.
74	An antagonistic non-verbal response to a non-antagonistic peer statement/action.

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Each category was recorded by using a two-digit code. Approximately every three seconds, the coder who was observing the videotape key-punched the numerals corresponding to the category that best described the activities of the previous three seconds. This process continued for the length of time the session lasted.

Analysis

A systematic observation of social skills among preschool children required that behavior be recorded in a reasonably low level of abstraction, since any higher level may easily be derived from the prototype categories. The 28 mutually exclusive and totally inclusive categories were developed with the idea of maximizing information initially, from which other variables could be derived.

The rationale of the selection of variables for analysis consisted of the following: first, the 28 categories were themselves variables. As TABLE 7-1 shows, the 28 categories were subcategories of a broader set of six major categories. Furthermore, the 28 categories could also be dichotomized into verbal or non-verbal, and into facilitating or nonfacilitating behavior. Second, combinations of categories like verbal initiation (11 + 13), non-verbal response (71 + 72 + 73 + 74), or different antagonistic activities (13 + 14 + 63 + 73 + 64 + 74) as proportions of the total tallies might be the variables of interest. Third, since the interaction was recorded as a constant (three second) interval the social skills might be viewed with reference to the sequence by which categories occurred. The same category may occur as frequently in the two groups but the discriminating variable might be the preceding behavior and/or the behavior which followed; that is, the variable of interest might be a pair of categories occurring in succession.

There were, therefore, three types of social skills variables:

(1) the 28 categories as the primary variables,

(2) certain combinations of categories expressed in terms of the relative frequency of occurrence, as the derived variables, and

(3) the sequence occurrence of categories as matrix variables in a transition frequency matrix.

The results for these three groups of variables follow.

The Primary Variables - the 28 Categories

At three-second intervals of coding a 20-minute videotape, the total number of tallies for 105 children reached 43,426, with an average of 414 tallies per child.

A Comparison of Relative Frequencies

For a direct comparison of relative frequencies in the Package and TV-HV groups the number of tallies per thousand, on the 28 categories are shown in TABLES 1, 2, and 3 of ATTACHMENT 7-2. A comparison of the categories from these tables will show the differential effects of age and sex grouping. TABLE 1 shows the distribution of tallies per 1,000 for the two ECE groups, across age and sex; TABLE 2 is a similar distribution broken down by age; and TABLE 3 is the distribution by age and sex grouping. The greater relative frequency of initiating constructive statements (Category 11) by the Package group (TABLE 2) seemed to be accounted for mostly by the four-year-old subjects. When sex grouping was taken into account (TABLE 3) it was seen that among three-year-old subjects the sex grouping had to do with the "masking" of any difference. Thus, TABLE 3 shows that 15% of the tallies (145 per 1,000) were in initiating constructive statements by the

three-year-old males in the Package group, with only 8% (83 per 1,000) for the corresponding group in the TV-HV. The three-year-old females and mixed groups in the TV-HV had more tallies in this category. Among the five-year-olds in the two ECE groups the higher frequency of initiating constructive statements by the Package group seemed to be accounted for mainly by the mixed group.

TABLE 1 (ATTACHMENT 7-2) shows that asking a question of the teacher (Category 24) occurred as frequently in the Package group as in the TV-HV group; on the average, the frequencies were 9 and 8 per thousand tallies. However, TABLE 2 shows that the equality was among the three-year-olds and that the four-year-old TV-HV subjects and the five-year-old Package subjects tended to ask more questions, when compared with their corresponding age group in the other ECE component. When sex grouping was brought into consideration (TABLE 3) it was seen that the differences just cited came mostly from the male groups in either component.

The frequent occurrence of quiet participation (Category 52) for the Package group was accounted for by the three- and five-year-olds as shown in TABLE 2 (ATTACHMENT 7-2); the four-year-old TV-HV subjects reversed the direction of difference.

The difference in the frequencies of withdrawing for security (Category 55) was more apparent among three-year-old subjects, although slight differences in the other age groups still favored the Package group. It might be hypothesized that certain social skills like complete participation with the group (no withdrawing for security) might ordinarily be achieved by the age of four or five but at three years of age such wholesome participation with a group could be effected already by the experience in a mobile classroom.

Twenty-four percent of the tallies for three-year-old TV-HV group were in the "withdrawing" category while only 10% for the three-year-old Package group were in this category. (See TABLE 2, ATTACHMENT 7-2).

Again, distraction (Category 56) showed a difference between the three-year-old subjects in the two groups more than the other two age groups - those in the Package group tending to be less distracted (TABLE 2, ATTACHMENT 7-2). This difference was mainly observed among the female group (TABLE 3) with 7% distraction for the TV-HV and only 1% for the Package.

Categories with apparent age-sex group effect are: (52) participates queitly with group, (55) withdraws for security, and (56) gets distracted. Categories with no apparent age-sex group effect are: (11-15) initiation of statements and action, (21) asks a question of peer, (25) listens or responds to teacher, (31) gives help, (51) shows nonverbal enthusiasm, and (53) withdraws from group and works alone.

No statistical tests were made for the foregoing comparisons although related variables were tested and the results are discussed in later sections. Educational implications of these differential results cannot be made until further study (this spring) can bear out the importance of these differences.

A Comparison of Observed and Expected Frequencies

The expected frequency under each category by ECE component was calculated. TABLE 7-2 shows the expected and the observed frequencies for the two ECE components. By expected frequency is meant the number of tallies expected if the two treatment groups were from the same population. To get the expected frequency by category and ECE component, the proportions of tallies--0.49629 for the package group and 0.50371 for the TV-HV group--were applied to the distribution of composite tallies (see TABLE 7-2, column 2).

The two groups were compared in direction and size of deviation from their respective expectations. It was interesting to note in TABLE 7-2 that the observed frequencies in the Package group exceeded the expected frequencies in both constructive and antagonistic initiation, while the TV-HV group had frequencies lower than expected. One possible explanation is that the Package group was less shy to the point of being more ready to initiate both constructive and antagonistic behavior.

Category 21 shows that the Package group tended to ask more questions of peers than the TV-HV; the Package group had 174 tallies on this category compared to the expected 153; on the other hand, the TV-HV had only 134 tallies compared to the expected 155 tallies.

When it came to listening to the teacher or responding to her (Category 25) the TV-HV had more tallies than expected (128 observed vs. 114 expected); while the Package had less (98 observed vs. 112 expected). This result was consistent with the observation that the TV-HV group had more tendency to seek security. It should also be mentioned that a teacher had to be with the group during the videotape recording, since some children had to have an adult around for security. Another implication of this difference was that the Package child tended to be more independent during a social interaction with peers.

One category which favored the TV-HV group was Category 31. The TV-HV child tended to give reasonable help to peers (Category 31) more than the Package child. TABLE 3 shows only 27 tallies observed against the 50 tallies expected for the Package group, and 73 tallies observed against the 50 tallies expected for the TV-HV group. This would seem to be contrary to what one would expect. The reason could be the TV-HV child's greater sensitivity to others' needs.

TABLE 7-2

EXPECTED[1] AND OBSERVED FREQUENCIES OF TALLIES BY ECE COMPONENT (PACKAGE AND TV-HV) AND BY SOCIAL SKILLS CATEGORY

Categories	Composite Tallies (Package and TV-HV)	Package		TV-HV	
		Exp. F	Obs. F	Exp. F	Obs. F
INITIATION[2]					
11 Constructive Statement	4667	2316.19	2578	2350.81	2089
12 Constructive action	122	60.54	63	61.42	59
13 Antag. statement	100	49.68	66	50.37	34
14 Antag. action	54	26.80	43	27.20	11
QUES. or REQ. FOR HELP					
21 Questions peer	308	152.86	174	155.14	134
22 Req. asst. (verbal)	7	3.47	4	3.53	3
23 Req. asst. (nonverbal)	6	2.98	4	3.02	2
24 Questions teacher	416	206.46	206	209.54	210
25 Listens to teacher	226	112.16	98	113.84	128
GIVING HELP					
31 Needed	100	49.62	27	50.37	73
32 Not needed	74	36.73	36	37.27	38
REFUSING HELP[3]					
41 With good reason	3	1.49	2	1.51	1
GROUP CONSCIOUSNESS					
51 Enthusiasm	80	39.70	47	40.30	33
52 Quiet participation	20187	10018.61	10187	10168.39	10000
53 Withdraws to work alone	271	134.49	9	136.51	262
54 Stops working	9675	4801.61	5247	4873.39	4428
55 Withdraws for security	3657	1814.93	1119	1842.07	2538
56 Gets distracted	912	452.62	392	459.38	520
RESPONSE TO PEER[4]					
61 NA-V/NA	597	296.29	298	300.71	299
71 NA-NV/NV	1787	886.87	836	900.13	951
62 NA-V/A	7	3.47	7	3.53	0
72 NA-NV/A	42	20.84	27	21.16	15
63 A-V/A	100	49.63	61	50.37	39
73 A-NV/A	23	11.41	20	11.59	3
64, 74 A-V,NV/NA	5	2.49	1	2.52	4
Total	43426	21551.94	21552	21874.07	21874

TABLE 7-2 (Cont'd)

NOTE: $X^2 = 1024.85; \chi^2 (.005)_{24} = 45.56$, $p < .005$. In connection with the large χ^2, it should be pointed out that the unit of observation is the three-second tally and not the individual subject; and that the extremely large number of tallies made the test very sensitive to differences.

[1]Expected frequencies were calculated for each category by multiplying the average proportion of tallies, 0.49629 (=21552/43426) in the package group and 0.50371 (=21874/43426) in the TV-HV group, by the corresponding composite tallies for the category.

[2]A fifth initiation category had zero frequency.

[3]A second category, "refusing reasonable request for assistance", had zero frequency.

[4]NA = nonantagonistic A = antagonistic
V = verbal NV = nonverbal

The symbol at the left of the slash sign is the response, and that on the right is peer behavior.

It is possible that the group which felt more need for help and security tended to render similar help. The Package child might have been used to the situation in the mobile classroom whereby each had an individual task to perform, or when in a group, the teacher was with them - a situation which would not directly promote desire to help.

However, giving help when not needed (Category 32) seemed to have the observed frequency equal to that expected for both groups.

A very notable result was obtained for the six categories 51 to 56, classified as group consciousness. Categories 51 to 56 are listed below:

51 Shows nonverbal enthusiasm.
52 Participates quietly with group on task.
53 Withdraws from group and works alone.
54 Does not work on the project whether alone or with group; watches others, bored, etc.
55 Withdraws for security.
56 Gets distracted by microphones, camera, lights, etc.

TABLE 7-2 shows that categories 51, 52, and 54 were more characteristic of the Package group, while Categories 53, 55, 56 of the TV-HV group.

The Package group was much less withdrawn - only nine tallies against the expected 134; the TV-HV had 262 tallies against the expected 137. The Package group showed more enthusiasm (Category 51); presumably this enthusiasm was at the time when the task was just starting, before some members of the Package group got bored and stopped working on the project (Category 53). The boredom could be a result of the group's exposure to creative tasks in the mobile classroom, thus making the doll house too commonplace to hold the child's attention for twenty minutes. The TV-HV child tended to withdraw more either to work alone or for security. The TV-HV group had more than twice the number of tallies (2,358 vs. 1,119) observed for the Package group, although their expected frequencies were about the same.

The two groups had about the same frequency of tallies for Category 61--a non-antagonistic verbal response to a non-antagonistic peer statement/action. However, in the nonverbal response of the same type (Category 71) the TV-HV had more tallies - 951 against the expected 900 compared with the observed 836 against the expected 887 of the Package group.

Responses to an antagonistic peer statement/action (Categories 62, 72, 63, 73) whether non-antagonistic (62, 72) or antagonistic (63, 73) had frequencies higher than expected for the Package group, and lower than expected for TV-HV. In these responses there was more tendency to verbalize antagonistic response (Category 63) for the children in the Package group.

The chi square test was highly significant, with $P < .005$; however, it should be mentioned that perhaps the chi square test of goodness of fit for the two separate distributions (or the test of independence between the two groups) was a very powerful test due to the extremely large N--a count of tallies, not subjects.

The Derived Variables

An analysis of variance was made on fifteen variables derived from the 28 categories. The first five variables originated as variables hypothesized to discriminate between the two groups. These variables had to do with verbalization, group participation, exploration, need for security, and antagonistic activities. After these theoretical concepts were formulated they were defined operationally in terms of the twenty-eight categories.

The next ten variables were formulated in a different manner. The 28 categories were reduced to 10 categories--five facilitating and five non-facilitating in the accomplishment of the task. The resulting 10 categories were used as variables in the analysis. From the new ten-category system a two-category (facilitating and non-facilitating behavior) system was used to classify observations.

Variables One Through Five

The first five variables and their operational definitions follow: The number between parentheses is the category code, and the commas indicate addition of the frequencies in those categories.

Variable 1. Proportion of time spent talking:

$$\frac{(11), (13), (15), (21), (22), (24), (61), (62), (63), (64)}{\text{Total tallies}}$$

Variable 2. Proportion of time spent participating with group:

$$\frac{\text{Total tallies} - (53), (54), (55), (56)}{\text{Total tallies}}$$

Variable 3. Proportion of time getting distracted:

$$\frac{(56)}{\text{Total tallies}}$$

Variable 4. Proportion of need for security:

$$\frac{(24), (25), (55)}{\text{Total tallies}}$$

Variable 5. Proportion of antagonistic activities:

$$\frac{(13), (14), (42), (63), (73), (64), (74)}{\text{Total tallies}}$$

It should be noted that variable two "participating" includes all but four categories of behavior which by definition cannot be properly called participation. It should not be confused with variable six in the next section--"participating quietly"--which includes only working quietly on the task with the group and nonverbal enthusiasm.

Categories 24 and 25 (asks a question of the teacher and listens or responds to the teacher) were included for variable 4 (need for security) because the need for having a teacher in the background came about as a need for security of some children and their questions or responses to the teacher was indicative of a need for security (asking adult instead of peer).

As input data for the computer these variables were frequencies per 1,000 tallies. They are reported here in terms of percentages which represent the "proportion of the total time" spent in the particular behavior, or (which is the same), the proportion of the total number of tallies recorded for the participant.

Variables Six through Fifteen

Variables six through fifteen correspond to the ten categories in the new ten-category system shown in TABLE 7-3. The table shows which of the twenty-eight categories were combined for the reduction. The first five categories were non-facilitating and the next five, facilitating in the completion of the task.

All ten variables were also operationally defined as proportions of the total tallies and reported as percentages. Since these ten categories were inclusive of the original 28 categories, the ten variables (six through fifteen) are also mutually exclusive and totally inclusive. This is not the case with the first five variables.

Analysis of the 15 Derived Variables

A three-factor analysis of variance with unequal N's in each cell was made on the data of 107 subjects for the first five variables, and 105[1] for the additional ten variables. Two- and three-factor interactions were assumed. The analysis of variance tables for the fifteen variables are found in ATTACHMENT 7-3, TABLES 1 to 15. The factor indices are:

A ECE Component (Package, TV-HV)

B Age (3, 4, 5)

C Sex grouping (all male, all female, mixed)

TABLE 7-3

REDUCTION OF THE 28 CATEGORIES TO 10 CATEGORIES

New Category Numbers	Original Categories Combined	General Category Names
Nonfacilitating:		
1	55, 56	Withdraws for security; gets distracted
2	13, 14, 15	Initiates antagonistic behavior
3	41, 42	Refuses help
4	63, 73, 64, 74	Responds with antagonism
5	53, 54	Works alone or stops working
Facilitating:		
6	51, 52	Participates quietly with group; nonverbal enthusiasm
7	11, 12	Initiates constructive behavior
8	21, 22, 23, 24	Asks questions or requests help
9	61, 71, 62, 72, 25	Responds positively or without antagonism
10	31, 32	Gives help

[1]We secured a list of those children who attended kindergarten, two of which were in this study. Hence the sample size was reduced to 105, after the first computer run.

The results showed no treatment effect was significant at the .05 levels. Some two- and three-way interactions were significant. Significant results from all 15 analyses, with $P < .10$ are summarized in TABLE 7-4.

The results discussed in the following sections were based on TABLE 7-4.

Significant Interaction Involving the ECE Component (Treatment): The treatment x age x sex grouping interaction in variable nine (responds with antagonism) was significant at .01. ATTACHMENT 7-4 is a table of means of the fifteen variables by treatment, age, and sex combination. Under variable nine, it can be seen that there were very few tallies for this variable since the mean percentages range only from 0.00 to 2.60. The rank order of the 18 cell means from highest to lowest percentage are:

Package, 5-year-old, mixed group	2.60%
Package, 3-year-old, female group	1.07
TV-HV 4-year-old male group	0.70
TV-HV 3-year-old mixed group	0.64
TV-HV 4-year-old female group	0.23
Package 3-year-old male group	0.20
Package 3-year-old mixed group	0.03
TV-HV 3-year-old female group	0.03
All other groups	0.00

Probably the significant result was produced by groups not connected by vertical lines shown above. If this is so, the interaction effect seems to be explained by saying that the mixed group tended to have more antagonistic response; and even more when among five-year-old Package children. On the other hand none of the other five-year-old subjects responded with antagonism. The fact that the next in rank was still a Package group of three-year-old female subjects shows that interaction with age and sex grouping was more apparent among the Package children than among the TV-HV.

TABLE 7-4

LEVELS OF SIGNIFICANCE OF SOME DIFFERENCES
TAKEN FROM THE ANALYSIS OF VARIANCE
TABLES (IN ATTACHMENT 7-3)

Variable	Source of Variation	P <
1 Talking	Age x Sex[1]	.05
2 Participating w/group	Age	.025
3 Exploring situation	Age	.10
4 Need for security	Treatment[2]	.10
4 " " "	Age	.01
5 Antag. activity	Treatment x Age x Sex	.10
6 Withdr./distraction	Treatment	.10
6 " "	Age	.01
6 " "	Sex	.10
6 " "	Treatment x Sex	.10
6 " "	Age x Sex	.10
7 Init. amt. activities	All sources	N.S. at .10
8 Refusing help	All sources	N.S. at .10
9 Resp. w/antag.	Treatment x Age	.10
9 " "	Age x Sex	.05
9 " "	Treatment x Age x Sex	.01
10 Working alone/leaving work	All sources	N.S. at .10
11 Quiet part./Nonverb. enth.	Age	.05
11 " "	Treatment x Age	.10
12 Init. const. behav.	Treatment	.10
12 " " "	Age x Sex	.10

TABLE 7-4 (Cont'd)

Variable	Source of Variation	P <
13 Asking quest./req. help	Sex	.025
13 " "	Age x Sex	.001
14 Resp. constructively	Age	.10
15 Giving help	All sources	N.S. at .10

[1]Sex refers to sex grouping - male, female, mixed

[2]Treatment levels are "Package" and "TV-HV"

Other Significant Interactions: There is a significant age-sex grouping interaction for variable 1, talking. TABLE 7-5 and FIGURE 7-1 show how age and sex grouping interact.

TABLE 7-5

MEANS[1] OF THE PROPORTIONS OF TIME SPENT IN TALKING BY AGE AND SEX GROUP TO SHOW AGE-SEX GROUPING INTERACTION

Age	Sex Group		
	M	F	Mixed
3	(12.53, 8.76) 10.65	(13.21, 19.95) 16.58	(9.47, 10.86) 10.17
4	(31.35, 21.02) 26.19	(16.00, 12.96) 14.48	(12.72, 0.00) 6.36
5	(18.35, 15.30) 16.83	(10.02, 9.50) 9.76	(29.32, 17.05) 23.19

[1]The entries are in percent. The numbers in parentheses separated by commas are the Package and TV-HV means respectively, while the number below them is the mean of the two ECE components.

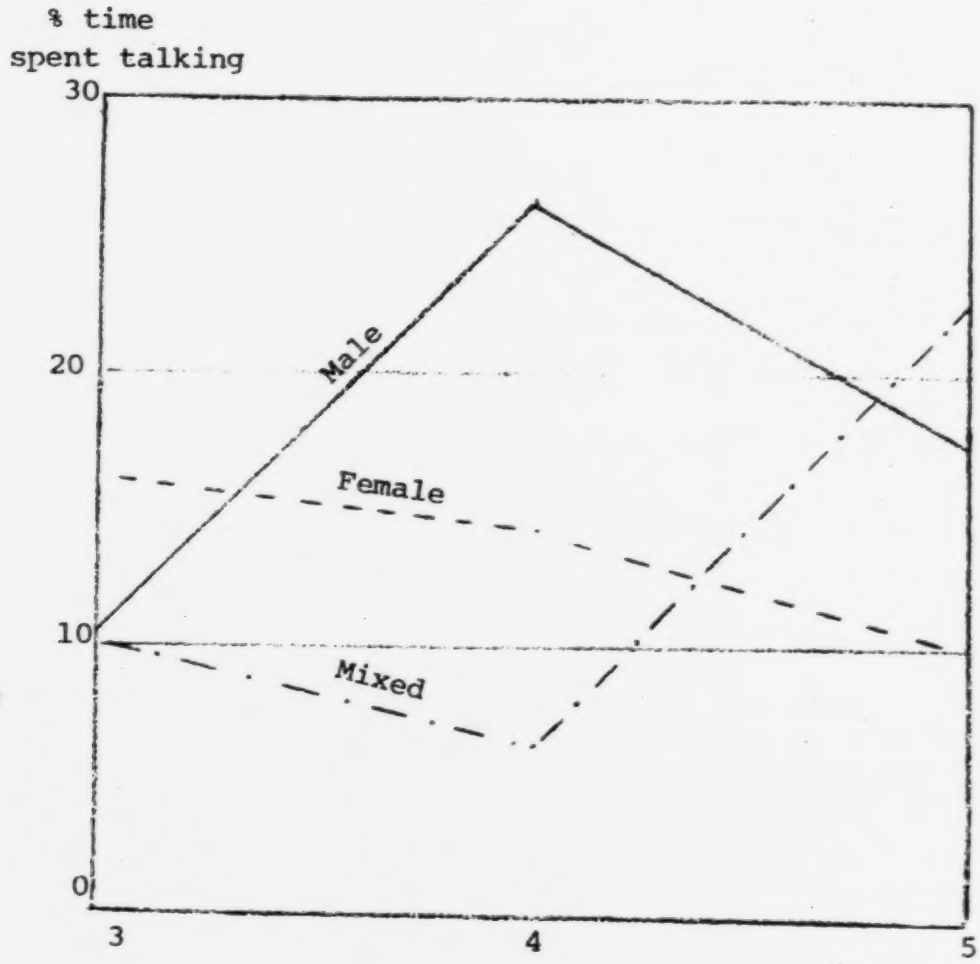

FIGURE 7-1

AGE-SEX•GROUPING INTERACTION ON THE PROPORTION
OF TIME SPENT IN TALKING

The three-year-old mixed group and the three-year-old male group spent about the same proportion of time in talking; but the four-year old mixed group had much less talking (6.36%) than the four-year-old male group (26.19%). The five-year-old mixed group and male group seemed to regress toward a mean with the mixed group's jump to 23.19% and the male group's drop to 18.83%. Among the female groups the proportion of time spent talking decreased from the younger to the older groups.

The parenthetical numbers show that within each age-sex combination the amount of verbalization is generally greater among those in the Package group than among those in the TV-HV group. The only exception of having a reversed direction is the three-year-old female group. The three-year-old mixed group and the five-year-old female group in either Package or TV-HV have about the same means, close to 10%. In all other age-sex group combinations (6 comparisons, out of the 9) the difference was in favor of the Package component; and these differences were large (See TABLE 7-5).

In general, there was very little antagonistic response--at the most, less than one percent of the time. But small as the percentage was, there was a significant interaction of age and sex grouping (variable 9). TABLE 7-5 and FIGURE 7-2 show age and sex grouping interaction.

TABLE 7-6

MEANS[1] OF THE PROPORTIONS OF TIME SPENT IN ANTAGONISTIC RESPONSE BY AGE AND SEX GROUP TO SHOW AGE-SEX GROUPING INTERACTION

Age	Sex Group		
	Male	Female	Mixed
3	(0.20, 0.00) 0.10	(1.07, 0.03) 0.55	(0.03, 0.64) 0.33
4	(0.00, 0.70) 0.35	(0.00, 0.23) 0.12	(0.00, 0.00) 0.00
5	(0.10, 0.00) 0.05	(0.00, 0.00) 0.00	(0.00, 0.64) 0.32

[1]The entries are in percent. The numbers in parentheses, separated by commas are the Package and TV-HV means respectively, while the number below is the mean across the two ECE components.

The two figures (7-1 and 7-2) reveal similar trends in the way the amount of talking and antagonistic response change from one age group to the next.

The three-year-old female group had the highest percentage with a mean of 0.55%. This is followed by the four-year-old male, three-year-old mixed and five-year-old mixed groups with means close to 0.33%. Within each age-sex combination the differences tend to favor the package groups (See TABLE 7-6) who had a lower proportion of antagonistic response.

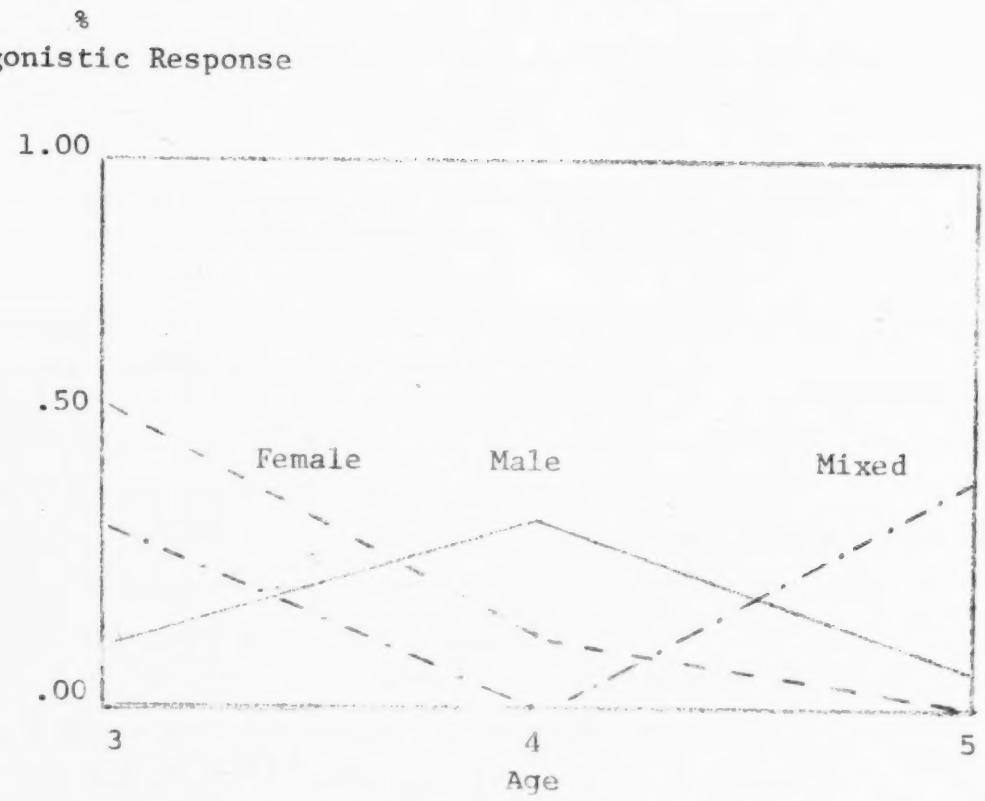

FIGURE 7-2

AGE-SEX GROUPING INTERACTION ON THE
PROPORTION OF TIME SPENT IN
ANTAGONISTIC RESPONSE

Significant Age Effects: There were significant age effects in four variables as seen in TABLE 7-4. These variables were group participation (2), need for security (4), withdrawing from group/getting distracted (6), and quiet participation/nonverbal enthusiasm (11).

TABLE 2 of ATTACHMENT 7-4 shows the means by ECE component and age. The means of each age group for the four variables are shown in TABLE 7-7.

TABLE 7-7

MEANS OF FOUR SOCIAL SKILLS VARIABLES WHICH HAD SIGNIFICANT AGE EFFECT, BY AGE

Variable	Age		
	3	4	5
(2) Participating with group	(62.10,54.46) 58.28	(71.33,73.18) 72.26	(81.35,74.08) 77.72
(4) Showing need for security	(10.36,24.76) 17.56	(4.95,9.50) 7.23	(1.75,3.51) 2.63
(6) Withdrawing/distracted getting	(11.55,23.70) 17.63	(7.26,8.48) 7.87	(2.46,4.54) 3.50
(11) Quiet participation/ verbal enthusiasm	(45.00,35.67) 40.34	(41.79,56.92) 49.36	(56.55,53.75) 55.15

Participation with group--whether quiet participation (variable 11) or overall participation (variable 2) increases with age. The need for security (variable 4) and withdrawing from group, whether for security or other reasons, combined with getting distracted (variable 6) decreases with age. (It should be mentioned that the four variables are not totally independent by definition. A high proportion in variables 2 and 11 would usually, but not necessarily imply a low proportion in variables 4 and 6).

Variables in the Two-Category System

The tallies in the ten categories (TABLE 7-3) were dichotemized into facilitating (categories six through ten) and nonfacilitating behavior (categories one through five). A comparison of the respective relative frequencies (tallies per thousand) of facilitating behavior between the Package and TV-HV groups by age and sex is shown in FIGURE 7-3.

The tallies enclosed by dotted lines represent the group with a higher frequency of facilitating behavior; and the figure shows that the Package group had a slightly greater frequency of facilitating behavior than the TV-HV group, across all subgroups of age and sex group. Comparisons by age show that the three and five-year-old subjects in the Package group had more tallies for the facilitating behavior than the corresponding subjects in the TV-HV group. Differences by sex group can also be noted in the diagram.

The Matrix Variables[1]

It was said earlier that the 28 categories were reduced to ten categories. The string of numbers representing the categories observed in a twenty-minute interaction sequence was tabulated in a transition matrix; the matrix is a display of paired categories of interaction and "transition" refers to the change from one category to the next as coding for each subject takes place at approximately three-second intervals.

Thus, the series of numbers corresponding to the categories were tallied into a ten by ten matrix for each subject, one pair at a time, so

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[1]All social skills data were processed at the University of Michigan Computing Center, using the Interaction Analysis Matrix Program, originally developed by Dr. Deagelia Pena for Dr. Ned A. Flanders at the School of Education.

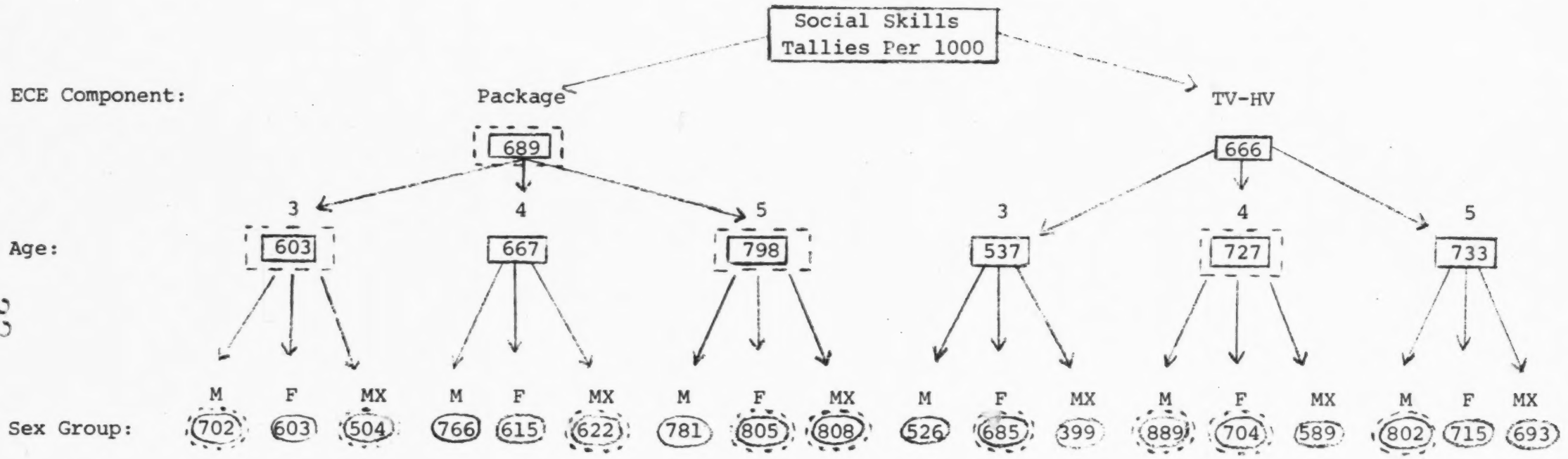
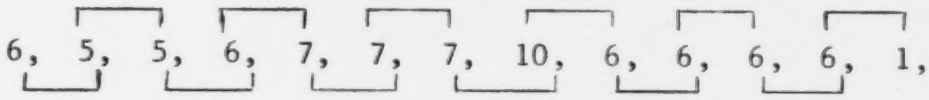


FIGURE 7-3 -- RELATIVE FREQUENCIES OF FACILITATING BEHAVIOR[1] IN HIERARCHICAL FORM TO ILLUSTRATE DIFFERENTIAL TALLIES BY ECE COMPONENT, BY AGE, AND BY SEX GROUP

[1]The relative frequency of a category or behavior is the number of tallies for that category or behavior per 1000 tallies. Categories six through ten of TABLE 7-3 were considered facilitating behavior in contrast with categories one through five, considered to be non-facilitating behavior. Dotted lines indicate the group under one ECE component with a higher frequency of facilitating behavior when compared to the corresponding group under the other ECE component.

that the second number of the previous pair is the first number of the next pair. To illustrate, consider the sequence



which an observer listed at the approximate rate of one code every three seconds, while watching the video tape. Every pair connected by a bracket was tallied into a matrix so that the first number of a pair designates the row of the cell and the second number designates the column of the cell where the tally for the pair is to be entered. Thus using the above illustration the first tally goes into the sixth row, fifth column, the second tally goes into the fifth row, fifth column, ..., and the last tally goes into the sixth row, first column.

Before discussing the results from the analysis of variance of matrix variables, comparisons without the use of statistical tests will be discussed in the next two sections in order to orient the reader who has not previously made use of matrices for analyzing interaction.

Composite Matrices

A composite matrix is a matrix of the combined frequencies of two or more matrices. As discussed in this section, the composite matrix was obtained by combining frequencies of all individual matrices in either ECE component. TABLES 7-7 and 7-9 are composite millage matrices (matrices with cell entries representing frequencies per thousand tallies) for the Package and TV-HV components respectively. Each cell is identified by its row and column categories which indicate the transition from one category to the next category. The diagonal cells from top left to bottom right are the

TABLE 7-8

COMPOSITE 10 x 10 MILLAGE MATRIX OF SUBJECTS IN THE ECE PACKAGE COMPONENT

Total tallies = 21552

CATE GORY	1	2	3	4	5	6	7	8	9	10
1	60	0	0	0	4	5	1	0	0	0
2	0	2	0	0	0	0	1	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	4	4	0	0	199	25	9	1	0	0
6	4	1	0	0	25	382	42	6	13	0
7	2	0	0	0	8	41	57	5	8	0
8	0	0	0	0	2	3	4	2	5	0
9	0	0	0	0	5	15	13	2	24	0
10	0	0	0	0	0	0	0	0	0	2

TABLE 7-9

COMPOSITE 10 x 10 MILLAGE MATRIX OF SUBJECTS IN THE ECE TV-HV COMPONENT

Total tallies = 21874

CATE GORY	1	2	3	4	5	6	7	8	9	10
1	128	0	0	0	5	5	2	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	1	0	0	0	0	0	0
5	5	0	0	0	173	24	6	0	3	0
6	4	0	0	0	23	374	35	7	13	0
7	1	0	0	0	6	33	42	4	9	1
8	0	0	0	0	1	3	2	2	6	0
9	0	0	0	0	5	17	8	1	28	0
10	0	0	0	0	0	2	1	0	0	3

"steady-state" cells and each gives the total number of times that a category follows the same category in a three-second interval of coding.

It should be recalled that categories one through five are non-facilitating (NF) categories while categories six through ten are facilitating (F) categories. For both groups the greater portion of the tallies are in the F-F quadrant, i.e., in the quadrant signifying transitions from a facilitating to another facilitating category. Not much contrast could be seen in the two composite matrices. The cell with the greatest number of tallies was the 6-6 cell, a steady-state cell for group participation, followed by the 5-5 cell, a steady-state cell for leaving the group to work alone or to stop working. The preponderance of tallies in the steady-state cells shows the minimal interaction which took place. The nature of the task (building a house with toys) did not seem to promote enough interaction, especially verbal interaction.

One steady-state cell on which the two groups may be compared is the 1-1 cell representing the steady-state cell of category one (withdrawing from group and getting distracted). The TV-HV group had twice as many tallies on this cell (128 vs. 60). It means that once a subject "withdrew" from the group, the TV-HV subject would still be in this state at the next tally, twice as often as the Package subject. Emerging from a withdrawing state into a different state is more likely to happen for a Package subject.

FIGURE 7-4 shows the tallies for each group, in each of four quadrants. The numbers indicate the number of times, per 1,000 tallies, that the indicated transitions happened.

(NF-NF)	(NF-F)
272 (Package)	42 (Package)
311 (TV-HV)	40 (TV-HV)
(F-NF)	**(F-F)**
47 (Package)	624 (Package)
40 (TV-HV)	632 (TV-HV)

FIGURE 7-4

THE FOUR QUADRANTS OF THE 10 x 10 COMPOSITE MILEAGE MATRICES OF THE PACKAGE AND TV-HV GROUPS

An implication for the mobile classroom might be the need to increase tallies in the (NF-F) quadrant with a corresponding decrease in the (NF-NF). In interaction terms it means that one social skill to be emphasized could be the child's spontaneous desire to "go back" and interact with the group in a facilitating manner, instead of staying in a non-facilitating state for a good length of time. There was a slight difference favoring the Package group in the (NF-NF) quadrant, as the figure shows.

Four Individual Matrices

For some variables it was seen that differences between the Package group and the TV-HV group could be accounted for by the age factor. To illustrate further these differences, matrices of four children shown in TABLES 7-10 through 7-13 are presented in this section. They are those of:

(1) a three-year-old subject in a mixed group, Package Component

(2) a three-year-old subject in a mixed group, TV-HV Component

(3) a five-year-old subject in a mixed group, Package Component

(4) a five-year-old subject in a mixed group, TV-HV Component.

TABLE 7-10

MILLAGE MATRIX (FREQUENCY PER THOUSAND TALLIES) OF A THREE-YEAR-OLD SUBJECT IN A MIXED GROUP, PACKAGE COMPONENT
(P3)

Total Tallies = 544
ID 2331019

CATE GORY	1	2	3	4	5	6	7	8	9	10
1	15	0	0	0	0	0	2	7	0	0
2	0	2	0	0	0	0	0	2	2	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	2	2	0	0	46	11	13	15	6	0
6	2	0	0	0	13	101	61	24	4	2
7	2	2	0	0	18	57	195	31	20	2
8	4	0	0	0	6	17	18	20	64	0
9	2	0	0	0	11	18	35	29	114	0
10	0	0	0	0	0	2	2	0	0	0

TABLE 7-11

MILLAGE MATRIX (FREQUENCY PER THOUSAND TALLIES) OF A THREE-YEAR-OLD SUBJECT IN A MIXED GROUP, TV-HV COMPONENT (P3)

ID2331019;
Total Tallies = 544

CATEGORY	1	2	3	4	5	6	7	8	9	10
1	53	0	0	2	0	2	16	2	4	0
2	0	18	0	2	2	2	9	5	5	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	12	0	2	0	0	7	0
5	5	5	0	0	32	11	19	5	4	2
6	4	2	0	0	5	75	72	14	18	2
7	7	9	0	2	25	77	201	19	28	2
8	7	2	0	0	4	4	9	2	21	0
9	4	5	0	4	16	19	39	0	70	0
10	0	2	0	0	0	0	4	0	0	7

TABLE 7-12

MILLAGE MATRIX (FREQUENCY PER THOUSAND TALLIES) OF A FIVE-YEAR-OLD SUBJECT IN A MIXED GROUP, PACKAGE COMPONENT (P5)

ID 2531070:
Table Tallies = 291

CATE GORY	1	2	3	4	5	6	7	8	9	10
1	27	0	0	0	0	3	7	0	0	0
2	0	0	0	0	3	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	65	0	0	7	3	0	0
5	0	0	0	0	3	10	24	0	3	0
6	0	0	0	3	0	137	103	21	24	0
7	3	3			17	93	196	31	21	0
8					17	17	17	10	14	0
9	7	0	0	7	0	24	14	10	48	0
10	0	0	0	0	0	0	0	0	0	0

TABLE 7-13

MILLAGE MATRIX (FREQUENCY PER THOUSAND TALLIES) OF A FIVE-YEAR-OLD SUBJECT IN A MIXED GROUP, TV-HV COMPONENT (T5)

ID 1532138
Total Tallies = 334

CATEGORY	1	2	3	4	5	6	7	8	9	10
1	96	0	0	0	6	6	3	0	0	0
2	0	0	0	0	0	3	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	3	0	0	27	9	18	0	6	0
6	12	0	0	0	3	251	99	24	15	0
7	3	0	0	0	18	96	126	15	24	0
8	0	0	0	0	6	18	12	3	12	0
9	0	0	0	0	3	21	24	9	27	0
10	0	0	0	0	0	0	0	0	0	0

These four matrices were semi-randomly drawn from the matrices within the three- and five-year-old mixed group cells of each component. It was semi-random in the sense that a matrix drawn at random with the total number of tallies very different from the average matrix was replaced by one with the number of tallies nearest the average. The four matrices are mileage matrices (with frequencies per 1,000); hence, direct comparisons of frequencies could be made. The main point in illustrating a few ways of comparing matrices was to show the "story" which a matrix might tell about an interaction sequence.

The nature of the original 28 categories was taken into account when the reduction to ten categories was made, so that approximately the numbers one through ten correspond to the ordering of categories from the least facilitating to the most facilitating. There could be arguments regarding the assignment of scale values expecially for consecutive categories within the facilitating, or within the non-facilitating side of the scale. However, there might be less difference of opinion when facilitating and non-facilitating categories are compared. At any rate, TABLE 7-3 shows the approximate correspondence between the five categories on the non-facilitating side of the scale and the five on the facilitating side. For example, consider the two middle categories. The least non-facilitating (Category 5), is "works alone or stops working", and this category is just one step below the least facilitating "participates with group; enthusiasm" (Category 6). A glance at the categories below five and those above six might show that indeed categories four down to one, and seven up to ten are reasonably placed relative to the middle categories five and six. Another example of the basis of assigning scale values are categories two and four; it was arbitrarily considered that to <u>initiate</u> antagonistic behavior (Category 2) was less desirable than to <u>respond</u> with antagonism.

For brevity, in this section the following notations were adopted:

P3 = Package, 3-year-old subject

T3 = TV-HV 3-year-old subject

P5 = Package, 5-year-old subject

T5 = TV-HV 5-year-old subject

Cell (1, 1) is the steady-state cell for "withdraws for security" and cell (6, 6) is that for group participation and enthusiasm. A picture of an approximate sequence for the P3 child to change behavior from withdrawal (Category 1) to group participation (Category 6) is obtained in the following manner: Across row one, TABLE 7-10, it is seen that the behavior that is most likely to follow category one (withdrawing from group) is category eight (asks questions or requests for help) because this is the non-diagonal (transition) cell with the highest frequency. For T3 (TABLE 7-10), it was category 7 (initiates constructive behavior). Because of the shift from category 1 to category 8, for P3, one now looks at row eight. The most likely event following is category 9. If one follows this scheme the next categories would be 7, 6, 6. In summary, using category numbers one has the following most probable sequence for P3 to change his behavior from withdrawal (1) to group participation (6):

P3: 1, 8, 9, 7, 6, 6

Following the same procedure, the sequence below is obtained for T3:

T3: 1, 7, 6, 6

A few points of comparison follow. First, P3 stayed for a shorter time in the withdrawn state (15 tallies)--less than 1/3 the time spent in that state by T3 (53 tallies). Both children, at one time or another, could manage to leave this non-facilitating state. On the average both

children did not directly shift to quiet participation with the group, but "interacted" first before working with the group as shown by the category numbers between one and six. P3 shifted to three different facilitating categories--asks questions or requests help (8), responds positively (9), and initiates constructive behavior (7) before finally working quietly with the group (6). T3 had only one other type of interactive behavior in shifting from category one to category six and that was initiating constructive behavior (7). Of significance though was the observation that on the average "quiet participation" was most likely to be preceded by initiating constructive behavior (category 7) for either P3 or T3.

Studying the same change of behavior from category one to category six, P5 and T5 (TABLES 7-12 and 7-13) had the following approximate sequences:

P5: 1, 7, 6, 6

T5: 1, 6, 6

P5 "behaved" like T3, but T5 had even less intermediate interaction than T3, as seen by the immediate shift from the withdrawn state to quiet participation. If the variety of facilitating interaction which happens as a child "leaves" the withdrawn state and "enters" the quiet-participation state is any measure of a high level of social skills, then the following comparisons could be made; the comparison was in favor of the subjects at the left of the "greater than" (>) sign:

Between ECE components: $\begin{cases} P5 > T5 \\ P3 > T3 \end{cases}$

Between ages: $\begin{cases} T3 > T5 \\ P3 > P5 \end{cases}$

The following hypotheses might be developed from these comparisons:

1. At the same age level (age 5 or age 3) the van has the added effect of promoting interaction.
2. The three year olds within the TV-HV component and within the Package component tend to be less inhibited in interacting with a group than the five year olds. For the P3 P5 comparison it should be stressed that this was the case after initial mobile classroom experience; the last phrase is underscored because it is likely that the results would be different if the five-year-old child had been exposed to two or three years' experience in the van.

Analysis of Variance of Transition Variables in a Ten-By-Ten Interaction Matrix (Variables 16-19)

The theoretical and operational definitions of the four transition variables, in terms of the ten x ten matrix are given below (Refer to one of TABLES 8 to 13):

Variable 16, (F-F): the total number of transitions from a facilitating to a facilitating category as a proportion of all the possible transitions from a facilitating category; hence, the proportion

$$\frac{\text{total freq. in the 25 cells of lower right quadrant}}{\text{total tallies in categories 6 through 10}}$$

or $$\frac{(6\text{-}6) + (6\text{-}7) + \ldots + (10\text{-}9) + (10\text{-}10)}{\text{col. totals 6, 7, 8, 9, 10}}$$

Variable 17, (NF-F): the total number of transitions from a non-facilitating to a facilitating category as a proportion of all the possible transitions from a non-facilitating category; hence, the proportion

$$\frac{\text{Total freq. in the 25 cells of upper right quadrant}}{\text{total tallies in categories 1 through 5}}$$

or $$\frac{(1\text{-}6) + (1\text{-}7) + \ldots + (5\text{-}9) + (5\text{-}10)}{\text{col. totals } 1, 2, 3, 4, 5}$$

Variable 18, (NF-NF): the total number of transitions from a non-facilitating category to a non-facilitating category as a proportion of all the possible transitions from a non-facilitating category; hence, the proportion

$$\frac{\text{total freq. in the 25 cells of upper left quadrant}}{\text{total tallies in categories 1 through 5}}$$

or $$\frac{(1\text{-}1) + (1\text{-}2) + \ldots + (5\text{-}4) + (5\text{-}5)}{\text{col. totals } 1, 2, 3, 4, 5}$$

Variable 19, (F-NF): the total number of transitions from a facilitating to a non-facilitating category as a proportion of all possible transitions from a facilitating category; hence, the proportion

$$\frac{\text{Total freq. in the 25 cells of the lower left quadrant}}{\text{total tallies in categories 6 through 10}}$$

or $$\frac{(6\text{-}1) + (6\text{-}2) + \ldots + (10\text{-}4) + (10\text{-}5)}{\text{col. totals } 6, 7, 8, 9, 10}$$

By definition, a high "score" in the (F- F) and (NF-F) variables (16 and 17) and a low score in the (NF-NF) and (F-NF) variables would be desired.

TABLES 16 through 19 of ATTACHMENT 7-3 are the ANOVA tables for the four transition variables. The first three transitions showed significant age effects ($P < .001$ for the first and $P < .05$ for the other two). The numbers in the last column of TABLE 1, ATTACHMENT 7-4, for variables 16 and 17 are displayed graphically in FIGURES 7-5 and 7-6, in order to illustrate differential age effects. The figures show that the four- and

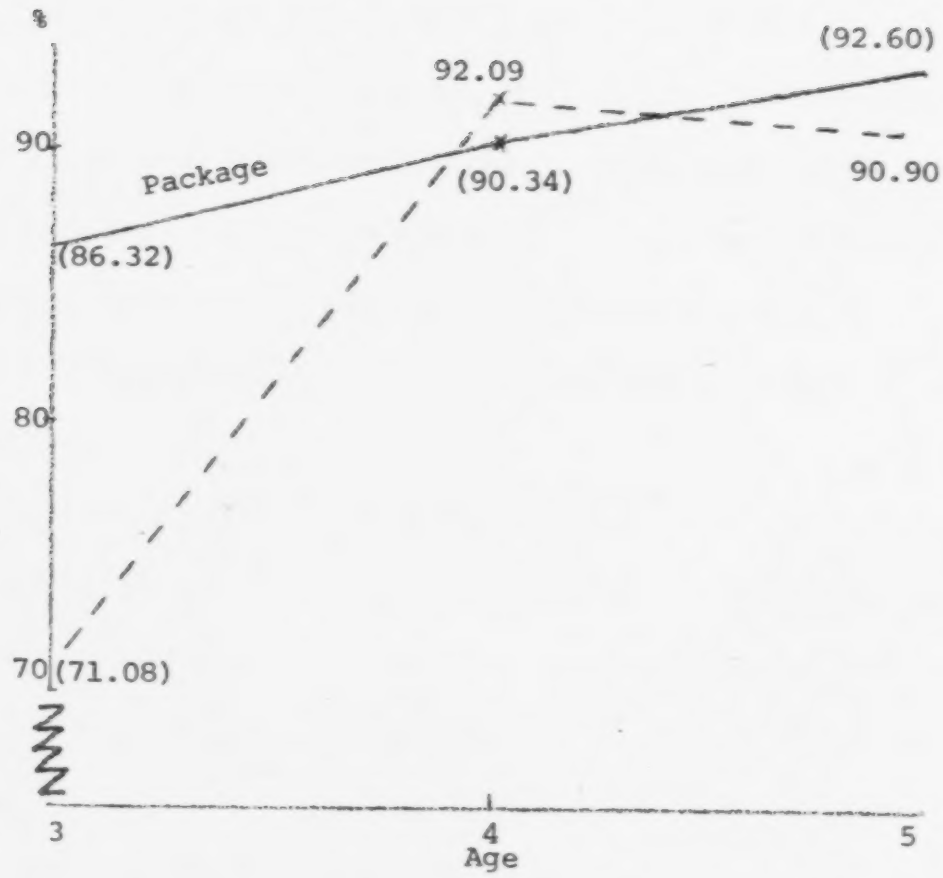


FIGURE 7-5.--Differential Age Effects on the F-F Transition (Variable 16)

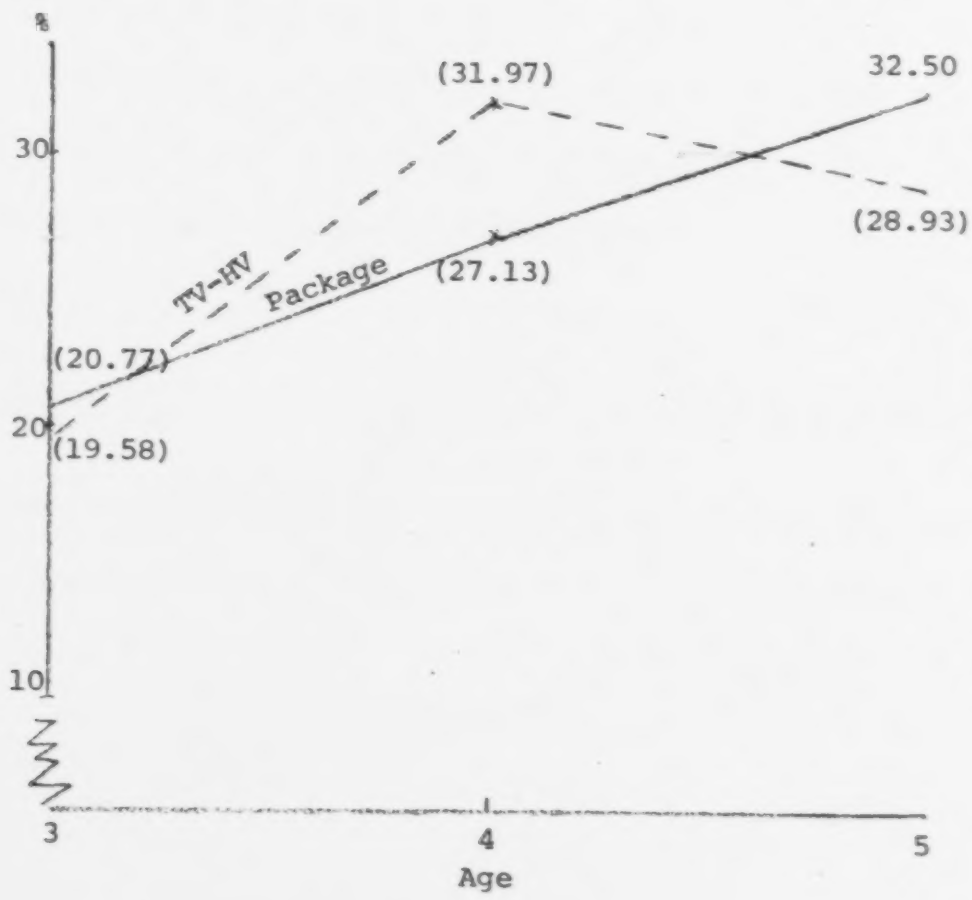


FIGURE 7-6.--Differential Age Effects on the NF-F Transition (Variable 17)

five-year-olds did better significantly than the three-year-olds. Generally then, older children tended to stay longer in a facilitating state and changed more easily from a non-facilitating to a facilitating behavior. From the same column and from FIGURES 7-5 and 7-6 it can also be seen that within the ECE treatment group, the three-year-old Package subject did much better than the three-year-old TV-HV in the F-F variable and slightly better in the NF-F variable.

FIGURE 7-7 (also obtained from TABLE 1, ATTACHMENT 7-4) shows that the significant age effect on the NF-NF transition could be explained by the greater tendency of younger subjects to stay in a non-facilitating state. There is no significant result in the analysis of variance of the variable F-NF. FIGURE 7-8 shows the treatment-by-age means. A study of the three figures (7-5 to 7-7) reveals a striking contrast between the Package and the TV-HV group in terms of the age effects on the four different types of transition. That one for the Package group shows "improvement" with age in almost a linear fashion for the F-F and NF-F transition variables. For the TV-HV group the four and five-year-old either remain about the same or that the four-year-olds are doing slightly better. In the F-F and F-NF transitions there appears to be a marked difference between the Package and the TV-HV three-year-olds.

Analysis of Variance of the Transition from "Isolation" to Participation (Variable 20)

Variable 20 is the transition from isolation (works alone stops working) to participation and is operationally defined in terms of the 10 x 10 matrix as the ratio

Cell (5, 6)/Col. 5

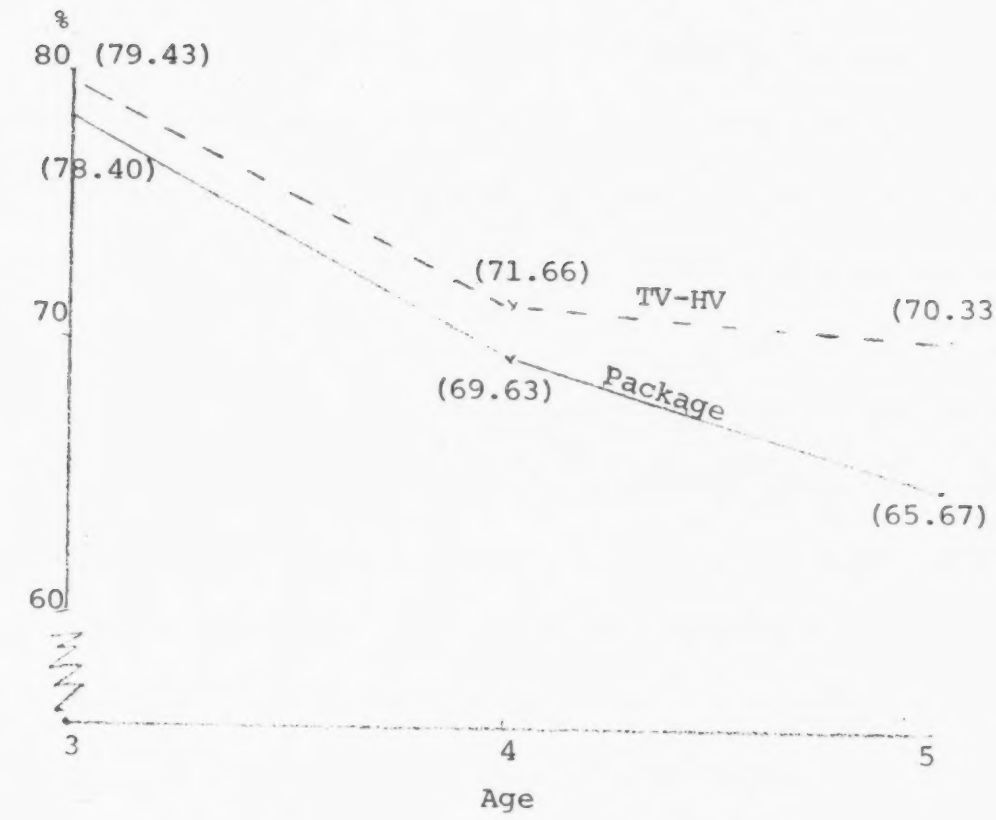


FIGURE 7-7.--Differential Age Effects on the NF-NF transition (Variable 18)

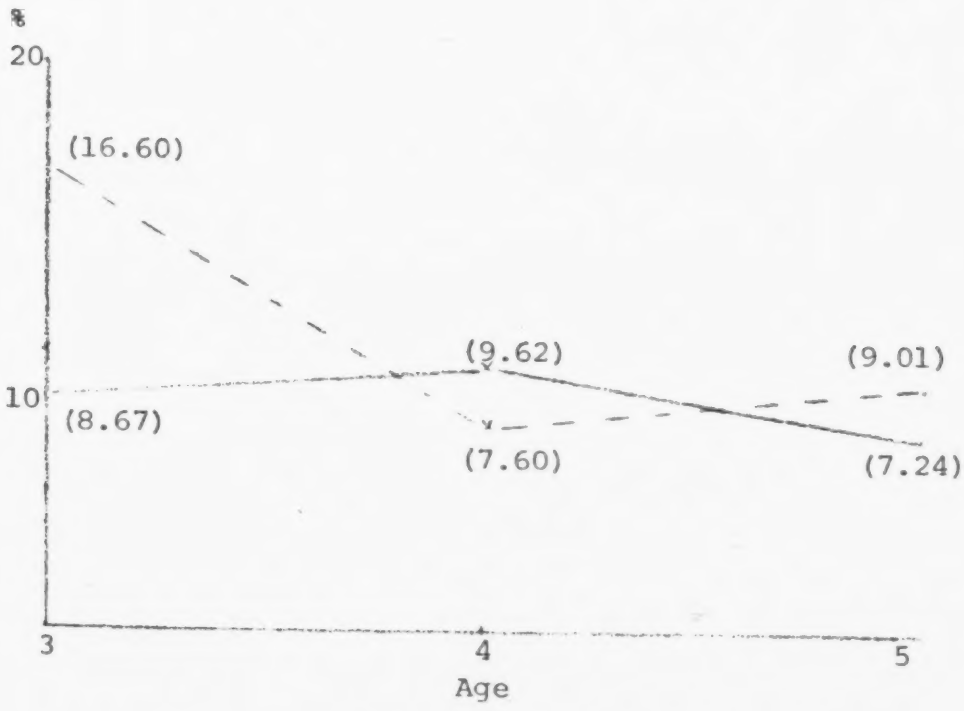


FIGURE 7-8.--Differential Age Effects on the F-NF transition (Variable 19)

That is, state 5 is "works alone/stops working". In the 10-category system, this leaves the subject ten possible choices of what his next behavior would be, one of which is to remain in the same state. Another behavior is to participate with the group (in many different ways). The variable gives the proportion of the total tallies for the "isolation" state 5 which led to group participation.

The ANOVA result showed a significant age effect at the .001 level. The difference seems to be explained by the five-year-olds' greater readiness to participate with the group than the three-year-olds and four-year-olds. The difference at the four-year-old level shows greater readiness on the part of the TV-HV; although no treatment-age interaction is significant. This is one of the few exceptions where the TV-HV is doing better than the Package.

FIGURE 7-9

DIFFERENTIAL AGE EFFECTS ON THE TRANSITION FROM ISOLATION TO PARTICIPATION (VARIABLE 20)

The Time-Line Display

Another way of looking at the social skills data is by means of the "time-line" graph. It is a time-sequence graphical display of what goes on every unit time interval (three seconds in this study) so that the change in behavior is seen by fluctuations, and the length of stay in a given state (category) is represented by the length of the horizontal bars across the graph. This was initiated for the Flanders interaction analysis system.[1] First, the 28 categories were grouped into seven categories such that category four was a "neutral" category midway between three non-facilitating (categories 1, 2, 3) and three facilitating categories (5, 6, 7). The following is a list of the seven categories and the equivalent combinations of the original 28 categories:

1 Antagonistic response/initiation (13, 14, 63, 73, 64, 74)

2 Refuses to help (41, 42)

3 Leaves group (53, 54, 55, 56)

4 Works quietly with group (52)

5 Constructive response (25, 51, 61, 71, 62, 72)

6 Gives help (31, 32)

7 Constructive initiation (11, 12, 15, 21, 22, 23, 24)

The seven categories were approximately ordered from least facilitating (category 1) through most facilitating (category 7).

FIGURES 7-10 and 7-11 are two sample displays. No comparison was intended since the two decks of coded cards were pulled out at random during the first few hours of coding videotape sessions, in order to see how much

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[1] Flanders, Ned A., Analyzing Teaching Behavior, Addison and Wesley Publishing Company, Reading, Massachusetts, 1970; pp. 161-168.

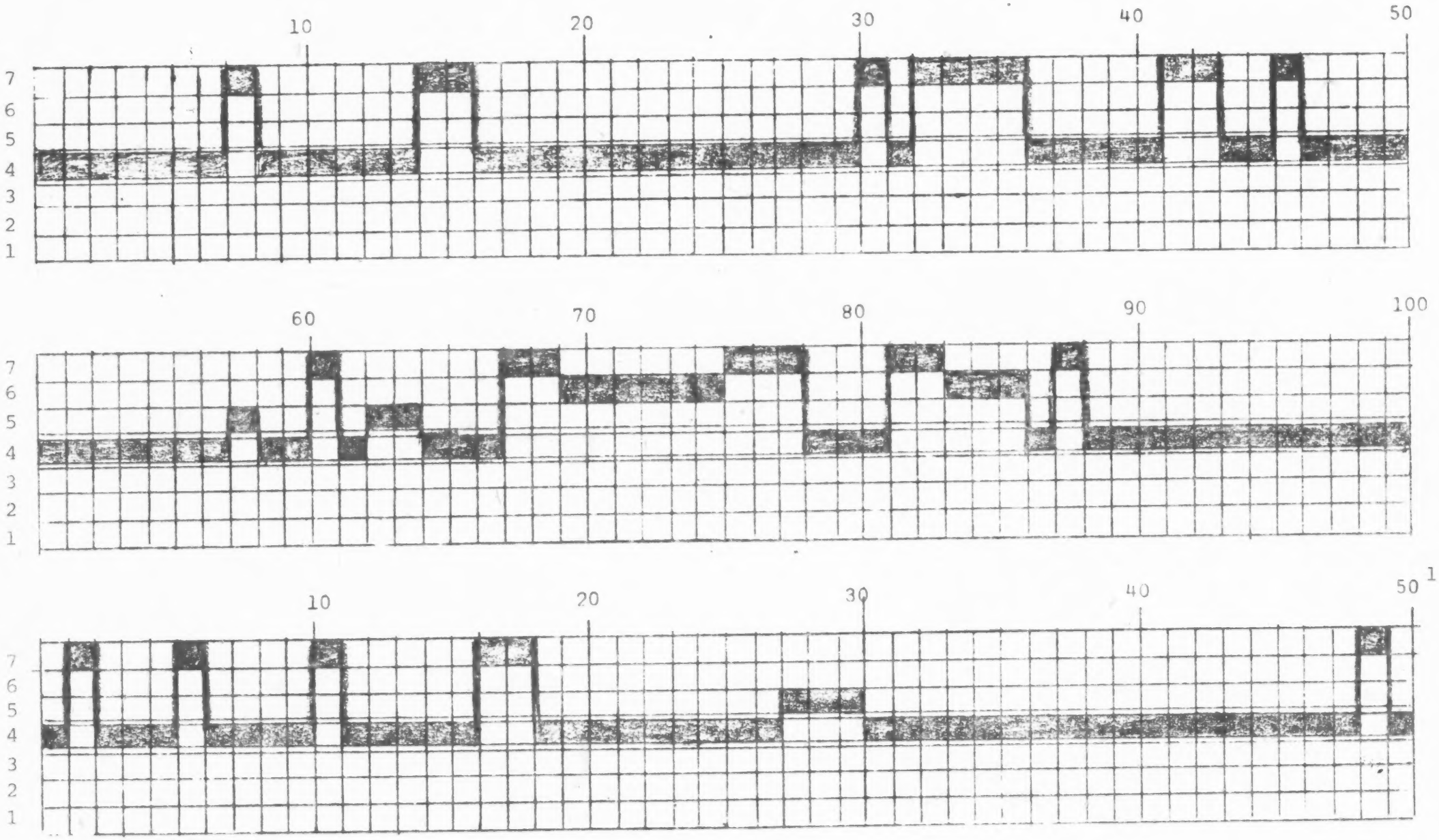

FIGURE 7-10:--SAMPLE TIME-LINE DISPLAY OF THE APPROXIMATE FIRST SEVEN AND A HALF MINUTES OF INTERACTION SHOWN BY A PACKAGE FIVE-YEAR-OLD MALE SUBJECT (SUBJECT ONE)

[1]One hundred fifty tallies represent approximately 450 seconds or seven and a half minutes of interaction.

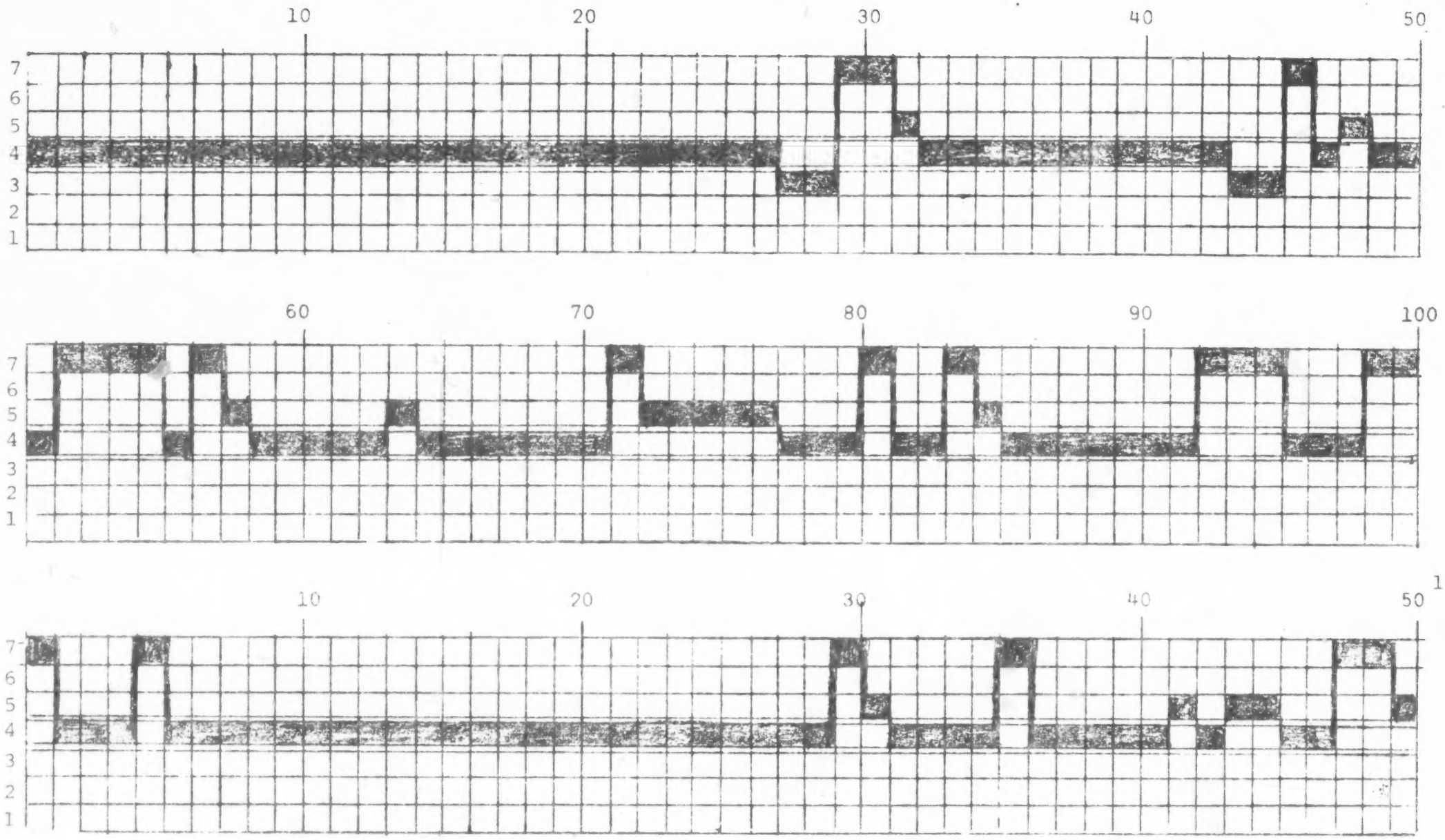

FIGURE 7-11:--SAMPLE TIME-LINE DISPLAY OF THE APPROXIMATE FIRST SEVEN AND A HALF MINUTES OF INTERACTION SHOWN BY A TV-HV FOUR-YEAR-OLD FEMALE SUBJECT IN THE FEMALE GROUP (SUBJECT TWO)

[1]One hundred fifty tallies represent approximately 450 seconds or seven and a half minutes of interaction.

interaction took place. However, they are presented here to initiate the possibility of developing the necessary computer programs to process coded data in case future phases of this project would require this type of analysis. As further illustration, FIGURES 7-10 and 7-11 show that subject one and subject two started by quietly working with the group on the house model. However, subject one took only 7 tallies or 21 seconds to leave that state (4) and acted in a most facilitating way by constructive initiation (7). On the other hand subject two took 27 tallies or 81 seconds to leave that state and acted in a slightly non-facilitating way by leaving the group activity (3). While both subjects showed facilitating behavior now and then, as displayed by the crests, it is also seen that subject one had more and longer crests, i.e., more and longer runs of facilitating behavior. One can go on and on and find interesting contrasts depending on the objective of the experiment. The time-line graph displays the raw data or the interaction sequence, directly as observed.

Conclusion and Implications

The recording and analysis of social skills among preschool children was an innovative approach; a systematic observation of interaction among groups of children in the Early Childhood Education project was tried for the first time. Under these considerations it seemed reasonable to consider any consistent direction of differences in the means between the two experimental groups (TV-HV and Package) as a significant finding in itself. The reporting of results included a range of statistical significance, with a clear pattern; that the results were in the predicted direction was a meaningful finding in this exploratory research. That is, there was strong indication that the mobile classroom contributed to the development of social skills which were assumed important in the learning process within a socially structured environment.

Several variables were analyzed and it may generally be said that the effect of the mobile classroom interacts with age in many cases, and with age and sex grouping in some instances. One generalization could be the fact that the age group which benefited most from the mobile classroom in social skills development was the three-year-olds; many social skills which would normally show in the four- or five-year-old child were already developed among the three-year-olds who had the mobile classroom experience.

The complexity of various interactions and the number of variables studied made it difficult to put the summary in a few generalized statements. Hence only a few examples will be cited here. However, it will be simple for the reader who wants more detailed results to refer to specific sections of this report. The section headings will help the reader/critic to decide which particular sections to read; this would depend on his variable of interest. It was difficult to find a complete explanation of the interaction among factors of treatment (Package and TV-HV), age, and sex. But where some explanation was obvious this was discussed.

The TV-HV group was more withdrawing and felt more need for security; children in this group left the task more often than those in the Package group and among those who left the group (both Package and TV-HV), the Package subject would be more likely to return to the task than the TV-HV. One interesting finding was the fact that the Package group initiated more statements and actions in both the nonantagonistic and antagonistic categories, although it should be mentioned that antagonistic behavior was minimal in both groups, compared to non-antagonistic behavior. In responding, there was more verbalization from the Package group.

The obvious pattern or direction and the varying levels of significance across different variables were encouraging results for both the use of the mobile classroom as a third ECE component and the use of the new social skills category system as a means of systematically recording interaction

among preschool children.

An examination of the distribution of the coded events in the 28 categories showed that between 60 and 70 percent of the time was spent in one category--quiet participation with the group. Obviously, there were few tallies left for the twenty-seven other categories on which to make comparisons. In spite of these, differences at the .10 and lower levels as well as the deviations of the observed frequencies from the theoretical frequencies in many categories show directions in favor of the mobile classroom. For the second phase of the social skills project next spring, there is a need to search for a task which by its very nature would promote more interaction. As far as the categories are concerned, very little change, if any, will be needed.

ATTACHMENT 7-1

RESEARCH DESIGN FOR SOCIAL SKILLS DATA

(Attachment 7-1)

TABLE I

ASSIGNMENT OF SERIAL ID NUMBERS TO 144 PARTICIPANTS[1] IN THE SOCIAL SKILLS EVALUATION

ECE Treatment	Age	Sex Grouping						All Sex Groups
		Male		Female		Mixed (2 F, 2 M)		
		Group I	Group II	Group I	Group II	Group I	Group II	
Package - (TV + HV + MC)	3	1 2 3 4 (6)	5 6 7 8	9 10 11 12 (7)	13 14 15 16	16 17 18 19 (7)	21 22 23 24	(20)
	4	25 26 27 28 (4)	29 30 31 32	33 34 35 36 (6)	37 38 39 40	41 42 43 44 (6)	45 46 47 48	(16)
	5	49 50 51 52 (6)	53 54 55 56	57 58 59 60 (7)	61 62 63 64	65 66 67 68 (5)	69 70 71 72	(18)
TV-HV	3	73 74 75 76 (4)	77 78 79 80	81 82 83 84 (6)	85 86 87 88	89 90 91 92 (8)	93 94 95 96	(18)
	4	97 98 99 100 (4)	101 102 103 104	105 106 107 108 (8)	109 110 111 112	113 114 115 116 (4)	117 118 119 120	(16)
	5	121 122 123 124 (7)	125 126 127 128	129 130 131 132 (6)	133 134 135 136	137 138 139 140 (4)	141 142 143 144	(17)
All Treatment - Age		(31)		(40)		(34)		(105)

[1]Number in parenthesis in each cell refers to the effective sample size--reduced, due to absences.

(Attachment 7-1)

TABLE 2

SUMMARY TABLE FOR ANOVA

Source of Variation	df	F
Between Groups	abcg-1	
A	a-1	Test all against MS for G/ABC
B	b-1	
C	c-1	
AB	(a-1) (b-1)	
AC	(a-1) (c-1)	
BC	(b-1) (c-1)	
ABC	(a-1) (b-1) (c-1)	
G's/ABC	abc (g-1)	Test against MS for S/G/ABC
Within Groups	abcg (n-1)	
S's/G's/ABC	abcg (n-1)	
Total	abcgn-1	

where a = levels of the A (treatment) factor is 2,
b = levels of the B (age) factor is 3,
c = levels of the C (sex grouping) factor is 3,
g = levels of the G (group) factor is 2,
n = number of children in a group is 4.

(Attachment 7-1)

ANOVA MODEL[1]

A 2 x 3 x 2 Mixed Model ANOVA - the group ( ) factor considered as random.

$$x_{ijklm} = \mu + \alpha_j + \beta_k + r_l + \alpha\beta_{jk} + \alpha r_{jl} + \beta r_{kl} + \alpha\beta r_{jkl} + \eta_{m/jkl} + \epsilon_{ijklm}$$

Design Matrix

C_1

	B_1	B_2	B_3
A_1	G_1	G_1	G_1
	G_2	G_2	G_2
A_2	G_1	G_1	G_1
	G_2	G_2	G_2

C_2

	B_1	B_2	B_3
A_1	G_1	G_1	G_1
	G_2	G_2	G_2
A_2	G_1	G_1	G_1
	G_2	G_2	G_2

C_3

	B_1	B_2	B_3
A_1	G_1	G_1	G_1
	G_2	G_2	G_2
A_2	G_1	G_1	G_1
	G_2	G_2	G_2

Where A is the treatment factor, B is age, C is sex grouping and G is group.

[1]In consultation with John Kennedy, Division of Development, Ohio State University.

ATTACHMENT 7-2

DISTRIBUTIONS PER 1000 TALLIES

ON THE 28 CATEGORIES OF SOCIAL SKILLS

(Attachment 7-2)

TABLE 1

Distribution Per 1000 Tallies
on the 28 Categories of Social Skills
by Category and ECE Component

Category	Component	Package	TV-HV	Both Components (Weighted)
Initiation	11	119	94	106
	12	2	2	2
	13	2	0	1
	14	1	0	0
	15	0	0	0
Question or Request for Help	21	7	6	7
	22	0	0	0
	23	0	0	0
	24	9	8	8
	25	4	5	4
Giving Help	31	1	3	1
	32	1	2	1
Refusing Help	41	0	0	0
	42	0	0	0
Group Consciousness	51	2	1	1
	52	470	457	463
	53	0	11	6
	54	243	202	221
	55	52	115	83
	56	18	23	20
Response to Peer	61	14	13	14
	71	37	41	39
	62	0	0	0
	72	0	0	0
	63	2	1	1
	73	0	0	0
	64	0	0	0
	74	0	0	0
Total No. of Tallies		21552	21874	43426

(Attachment 7-2)

TABLE 2

Distribution Per 1000 Tallies
on the 28 Categories of Social Skills
by Category, ECE Component, and Age

Component		Package			TV-HV		
Category \ Age		3	4	5	3	4	5
Initiation	11	95	139	135	99	70	112
	12	2	2	3	2	1	2
	13	6	0	0	2	0	0
	14	5	0	0	0	0	0
	15	0	0	0	0	0	0
Question or Request for Help	21	5	6	9	3	4	8
	22	0	0	0	0	0	0
	23	0	0	0	0	0	0
	24	7	12	12	6	17	5
	25	3	5	3	5	7	5
Giving Help	31	0	0	1	6	0	1
	32	2	0	1	4	0	0
Refusing Help	41	0	0	0	0	0	0
	42	0	0	0	0	0	0
Group Consciousness	51	0	1	5	0	0	2
	52	430	409	567	321	562	527
	53	1	0	0	29	0	0
	54	276	294	159	192	209	208
	55	96	41	3	238	49	19
	56	16	14	20	29	17	21
Response to Peer	61	6	19	18	12	10	19
	71	31	42	44	34	37	58
	62	0	0	0	0	0	0
	72	2	0	0	0	0	0
	63	1	0	4	1	1	0
	73	1	0	0	0	0	0
	64	0	0	0	0	0	0
	74	0	0	0	0	0	0
Total Tallies		9090	5186	7276	8712	6781	6381

TABLE 3

ibution Per 1000 Tallies on the 28 Categories of Social Skills,
by Category, ECE Component, Age and Sex Group

Package						TV-HV								
4			5			3			4			5		
	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed
25	131	102	123	93	191	83	182	97	116	80	0	135	81	136
0	4	2	0	8	0	6	2	0	1	1	1	2	3	3
5	0	1	0	0	1	1	0	6	1	0	0	0	0	0
0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9	4	10	5	5	18	2	11	4	8	5	0	9	8	9
0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
36	10	1	24	1	7	1	6	12	62	8	0	6	4	6
18	5	0	8	0	4	1	2	11	13	8	0	2	8	3
0	2	0	0	0	4	0	50	0	2	1	0	1	0	3
2	0	0	1	1	1	2	15	1	0	1	0	0	0	0
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0	7	2	4	0	0	3	0	0	0	3	3	5
11	398	433	552	641	505	397	373	211	592	547	588	547	536	473
0	0	0	0	0	0	41	2	22	0	1	0	0	0	0
64	291	376	170	171	139	344	21	51	66	238	251	128	260	241
36	70	1	2	8	1	39	206	499	1	34	150	42	0	22
19	19*	9	28	9	22	35	72	11	39*	12	9	15	18	40
20	13	28	18	14	23	8	5	16	20	13	0	25	21	8
42	45	45	43	40	49	25	54	43	75	40	0	70	51	45
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	2	1	0	1	0	0	0	2	0	0
0	0	0	0	0	16	0	0	7	5	1	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(Attachment 7-2)

TABLE 3

Distribution Per 1000 Tallies on the 28 Categories of Social Skills, by Category, ECE Component, Age and Sex Group

Component		Package									TV-HV					
Age		3			4			5			3			4		
Sex Group / Category		M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed
Initiation	11	145	101	61	225	131	102	123	93	191	83	182	97	116	80	0
	12	1	4	2	0	4	2	0	8	0	6	2	0	1	1	1
	13	3	14	0	5	0	1	0	0	1	1	0	6	1	0	0
	14	3	7	0	0	0	0	1	0	0	0	1	0	0	0	0
	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Question or Request for help	21	5	0	11	9	4	10	5	5	18	2	11	4	8	5	0
	22	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	23	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	24	9	2	7	36	10	1	24	1	7	1	6	12	62	8	0
	25	5	1	4	18	5	0	8	0	4	1	2	11	13	8	0
Giving Help	31	0	1	0	0	2	0	0	0	4	0	50	0	2	1	0
	32	6	1	0	2	0	0	1	1	1	2	15	1	0	1	0
Refusal to help	41	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Group Consciousness	51	1	0	0	3	1	0	7	2	4	0	0	3	0	0	0
	52	504	468	358	411	398	433	552	641	505	397	373	211	592	547	588
	53	0	0	3	0	0	0	0	0	0	41	2	22	0	1	0
	54	122	335	326	164	291	376	170	171	139	344	21	51	66	238	251
	55	118	11	149	36	70	1	2	8	1	39	206	499	1	34	150
	56	34	12	14	19	19*	9	28	9	22	35	72	11	39*	12	9
Response to Peer	61	1	4	14	20	13	28	18	14	23	8	5	16	20	13	0
	71	21	15	47	42	45	45	43	40	49	25	54	43	75	40	0
	62	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	72	4	4	0	0	0	1	0	0	2	1	0	1	0	0	0
	63	0	6	0	0	0	0	0	0	16	0	0	7	5	1	0
	73	0	5	0	0	0	0	0	0	0	0	0	0	1	0	0
	64	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ATTACHMENT 7-3

ANOVA TABLES FOR SOCIAL SKILLS DATA

(Attachment 7-3)

TABLE I

ANALYSIS OF VARIANCE FOR VARIABLE ONE (TALKING)

Source	Sum of Squares	D.F.	Mean Square	F
A	41076.96995	1	41076.96995	1.60
B	29292.35845	2	14646.17922	0.57
C	42968.60627	2	21484.30314	0.84
AB	40273.22211	2	20136.61106	0.79
AC	33022.74129	2	16511.37065	0.64
BC	256228.7874	4	84057.19685	2.50*
ABC	16334.44202	4	4083.810506	0.16
ERROR	2281413.723	89	25633.86205	

Notations: ANOVA Factors

A ECE-component treatment
B Age
C Sex grouping

Significance:

a $P<.10$
* $P<.05$
** $P<.025$
*** $P<.01$

These notations will be used throughout all the twenty tables in this attachment.

NOTE: The program BMDX64 (General Linear Hypothesis) was run at the University of Michigan Computing Center under consultation with Miss Esther Schaeffer of the Statistics Laboratory, Rockham School of Graduate Studies, University of Michigan, Ann Arbor, Michigan.

TABLE 2

ANALYSIS OF VARIANCE FOR VARIABLE TWO (PARTICIPATING WITH GROUP)

Source	Sum of Squares	D.F.	Mean Square	F
A	44638.61029	1	44638.61029	0.61
B	630079.0655	2	315039.5327	4.30**
C	340044.0969	2	170022.0484	2.32
AB	44631.70648	2	22315.85224	0.30
AC	38856.83252	2	19428.41626	0.27
BC	219558.2637	4	54889.56593	0.75
ABC	98963.13321	4	24740.78330	0.34
ERROR	6521989.962	89	73280.78609	

TABLE 3

ANALYSIS OF VARIANCE FOR VARIABLE THREE (EXPLORING SITUATION)

Source	Sum of Squares	D.F.	Mean Square	F
A	3454.182990	1	3454.182990	3.41[a]
B	4755.165197	2	2377.582599	2.35[a]
C	1127.814039	2	563.9070197	0.56
AB	2121.476375	2	1060.739187	1.05
AC	1205.375686	2	602.6878432	0.59
BC	4611.438973	4	1152.859743	1.14
ABC	5158.630185	4	1289.657546	1.27
ERROR	90159.72619	89	1013.030631	

TABLE 4

ANALYSIS OF VARIANCE FOR VARIABLE FOUR (NEED FOR SECURITY)

Source	Sum of Squares	D.F.	Mean Square	F
A	107296.1167	1	107296.1167	3.49[a]
B	357670.3068	2	178835.1534	5.81***
C	121035.7913	2	60517.89563	1.97
AB	72813.00361	2	36406.50181	1.18
AC	132445.1316	2	66222.56580	2.15
BC	299966.8015	4	74991.70038	2.44[a]
ABC	157234.5016	4	39308.62541	1.28
ERROR	2738873.050	89	30773.85449	

TABLE 5

ANALYSIS OF VARIANCE FOR VARIABLE FIVE (ANTAGONISTIC ACTIVITY)

Source	Sum of Squares	D.F.	Mean Square	F
A	676.1352394	1	676.1352394	1.99
B	654.2791769	2	327.1395884	0.96
C	61.36829207	2	30.68414604	0.09
AB	641.2487580	2	320.6243790	0.94
AC	179.4527822	2	89.72639111	0.26
BC	1825.653330	4	456.4133324	1.34
ABC	2966.531242	4	741.6328105	2.18[a]
ERROR	30293.45238	89	340.3748694	

TABLE 6

ANALYSIS OF VARIANCE FOR VARIABLE SIX (WITHDRAWING/GETTING DISTRACTED)

Source	Sum of Squares	D.F.	Mean Square	F
A	88928.76615	1	88928.76615	2.84[a]
B	385572.9853	2	192786.4926	6.16***
C	187414.2518	2	93707.12591	2.99[a]
AB	50819.47048	2	25409.73524	0.81
AC	153951.3612	2	76975.68058	2.46[a]
BC	270331.5857	4	67582.89643	2.15[a]
ABC	115719.0294	4	28929.75736	0.92
ERROR	2723425.640	87	31303.74299	

TABLE 7

ANALYSIS OF VARIANCE FOR VARIABLE SEVEN (INITIATING ANTAGONISTIC BEHAVIOR)

Source	Sum of Squares	D.F.	Mean Square	F
A	201.7282010	1	201.7282010	1.50
B	482.8569337	2	241.4284669	1.80
C	85.36350527	2	42.68175263	0.31
AB	198.3399148	2	99.16995739	0.74
AC	218.0615435	2	109.0307717	0.81
BC	617.5270859	4	154.3817715	1.15
ABC	651.2729234	4	162.8182308	1.21
ERROR	11664.53929	87	134.0751642	

All nonsignificant

TABLE 8

ANALYSIS OF VARIANCE FOR VARIABLE EIGHT (REFUSING HELP)

Source	Sum of Squares	D.F.	Mean Square	F
A	0.0339640951	1	0.0339640951	0.18
B	0.6405070103	2	0.3202535051	1.67
C	0.1883786223	2	0.0941893112	0.49
AB	0.0711674456	2	0.0355837228	0.19
AC	0.4731691471	2	0.2365845735	1.23
BC	0.4073398838	4	0.1018349710	0.53
ABC	0.9451402296	4	0.2362850574	1.23
ERROR	16.66666667	87	0.1915708812	

All nonsignificant

TABLE 9

ANALYSIS OF VARIANCE FOR VARIABLE NINE (RESPONDING WITH ANTAGONISM)

Source	Sum of Squares	D.F.	Mean Square	F
A	176.6817534	1	176.6817534	1.72
B	139.0377078	2	69.51885390	0.68
C	265.3799158	2	132.6899579	1.29
AB	585.7360467	2	292.8680233	2.85[a]
AC	242 2374331	2	121.1187166	1.18
BC	1017.934260	4	254.4835649	2.48*
ABC	1450.521368	4	362.6303420	3.52***
ERROR	8939.565476	87	102.7536262	

TABLE 10

ANALYSIS OF VARIANCE FOR VARIABLE TEN (WORKING ALONE/LEAVING WORK)

Source	Sum of Squares	D.F.	Mean Square	F
A	2331.939863	1	2331.939863	0.04
B	105511.6003	2	52755.80015	1.00
C	91826.11077	2	45913.05539	0.87
AB	81642.53691	2	40821.26845	0.77
AC	84237.19299	2	42118.59649	0.79
BC	196125.3014	4	49031.32536	0.92
ABC	403824.1266	4	100956.0316	1.90
ERROR	4611632.360	87	53007.26850	

All nonsignificant

TABLE 11

ANALYSIS OF VARIANCE FOR VARIABLE 11 (QUIET PARTICIPATION/NONVERBAL ENTHUSIASM)

Source	Sum of Squares	D.F.	Mean Square	F
A	2465.709368	1	1465.709368	0.46
B	390461.1820	2	195230.5910	3.63*
C	142582.4205	2	71291.21027	1.32
AB	255794.1473	2	127897.0737	2.38[a]
AC	15674.63585	2	7837.317927	0.15
BC	167674.8566	4	41918.71416	0.78
ABC	11493.17815	4	2873.294539	0.05
ERROR	4681200.604	87	53806.90349	

TABLE 12

ANALYSIS OF VARIANCE FOR VARIABLE 12 (INITIATING CONSTRUCTIVE BEHAVIOR)

Source	Sum of Squares	D.F.	Mean Square	F
A	53383.53144	1	53383.53144	3.48[a]
B	27089.76209	2	13544.88104	0.88
C	6600.697075	2	3300.348538	0.21
AB	21283.42218	2	10641.71109	0.69
AC	27301.99022	2	13650.99511	0.89
BC	144868.1191	4	36217.02977	2.36[a]
ABC	33779.25976	4	8444.814940	0.55
ERROR	1335954.248	87	15355.79595	

TABLE 13

ANALYSIS OF VARIANCE FOR VARIABLE 13 (ASKING QUESTIONS/RFQUESTING HFLP)

Source	Sum of Squares	D.F.	Mean Square	F
A	224.0387299	1	224.0387299	0.30
B	4464.252593	2	2232.126296	3.00
C	6085.962713	2	3042.981357	4.10**
AB	283.1029775	2	141.5514888	0.19
AC	880.7989427	2	440.3994714	0.59
BC	11207.11458	4	2801.778646	3.77***
ABC	1475.084845	4	368.7712113	0.50
ERROR	64646.50357	87	743.0632594	

TABLE 14

ANALYSIS OF VARIANCE FOR VARIABLE 14 (RESPONDING CONSTRUCTIVELY)

Source	Sum of Squares	D.F.	Mean Square	F
A	813.1695887	1	813.1695887	0.20
B	20094.93366	2	10047.46683	2.50[a]
C	1979.434996	2	989.7174980	0.25
AB	2133.701522	2	1066.850761	0.27
AC	15123.48551	2	7561.742757	1.88
BC	28803.87574	4	7200.968935	1.79
ABC	6189.254119	4	1547.313530	0.39
ERROR	349223.6845	87	4014.065339	

TABLE 15

ANALYSIS OF VARIANCE FOR VARIABLE 15 (GIVING HELP)

Source	Sum of Squares	D.F.	Mean Square	F
A	49.09025828	1	49.09025828	0.41
B	437.2013423	2	218.6006712	1.83
C	316.0627284	2	158.0313642	1.32
AB	184.0994133	2	92.04970664	0.77
AC	558.0907352	2	279.0453676	2.33
BC	823.0828403	4	205.7707101	1.72
ABC	855.2543591	4	213.8135898	1.79
ERROR	10416.38690	87	119.7285851	

All nonsignificant

TABLE 16

ANALYSIS OF VARIANCE FOR VARIABLE 16 ((F-F) TRANSITION)[1]

Source	Sum of Squares	D.F.	Mean Square	F
A	63463.35648	1	63463.35648	1.70
B	378351.7400	2	189175.8700	5.08***
C	75211.23237	2	37605.61619	1.01
AB	137423.2398	2	68711.61989	1.85
AC	26935.46968	2	13467.73484	0.36
BC	268938.0014	4	67234.50035	1.81
ABC	73043.84581	4	18260.96145	0.49
ERROR	3240002.637	87	37241.40962	

TABLE 17

ANALYSIS OF VARIANCE FOR VARIABLE 17 ((NF-F) TRANSITION)[2]

Source	Sum of Squares	D.F.	Mean Square	F
A	1.630449852	1	1.630449852	0.00
B	232593.2541	2	116296.6270	3.12*
C	49281.31553	2	24640.65776	0.66
AB	29399.18700	2	14699.59350	0.39
AC	59283.70043	2	29641.85022	0.80
BC	164879.6304	4	41219.90761	1.11
ABC	192741.9206	4	48185.48015	1.29
ERROR	3238390.512	87	37222.87945	

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[1]"Transition" from facilitating to facilitating category or steady state facilitating category.

[2]Transition from nonfacilitating to facilitating category.

TABLE 18

ANALYSIS OF VARIANCE FOR VARIABLE 18 ((NF-NF) TRANSITION)[1]

Source	Sum of Squares	D.F.	Mean Square	F
A	16376.85629	1	16376.85629	0.47
B	226710.7031	2	113355.3516	3.28*
C	39795.93455	2	19897.96727	0.58
AB	6045.390739	2	3022.695369	0.09
AC	18743.04788	2	9371.523939	0.27
BC	151206.9651	4	37801.74128	1.09
ABC	135149.8439	4	33787.46098	0.98
ERROR	3007227.726	87	34565.83593	

TABLE 19

ANALYSIS OF VARIANCE FOR VARIABLE 19 ((F-NF) TRANSITION)[2]

Source	Sum of Squares	D.F.	Mean Square	F
A	16222.07193	1	16222.07193	1.28
B	42623.25108	2	21311.62554	1.68
C	17397.81052	2	8698.905259	0.69
AB	42034.02682	2	21017.01341	1.66
AC	17450.80520	2	8725.402599	0.69
BC	89501.19506	4	22375.29876	1.77
ABC	80959.69668	4	20239.92417	1.60
ERROR	1101836.242	87	12664.78439	

All nonsignificant

[1]Steady state nonfacilitating category.

[2]Transition from facilitating to nonfacilitating category.

TABLE 20

ANALYSIS OF VARIANCE FOR VARIABLE 20 (CELL (5.6) COL. 5)[1]

Source	Sum of Squares	D.F.	Mean Square	F
A	4537.271955	1	4537.271955	0.37
B	124090.7129	2	62045.35645	5.05***
C	13954.15383	2	6977.076914	0.57
AB	59398.86369	2	29699.43185	2.42[a]
AC	11257.36608	2	5628.683041	0.46
BC	31025.57504	4	7756.393761	0.63
ABC	81385.65521	4	20346.41380	1.66
ERROR	1069478.619	87	12292.85769	

[1]This variable represents the time spent in the transition from working alone (cat. 5) to joining peers in quiet participation/ nonverbal enthusiasm (cat. 6) as a proportion of the total time spent in working alone or not working at all.

ATTACHMENT 7 -4

MEANS OF 20 SOCIAL SKILLS VARIABLES BY

ECE COMPONENT, AGE AND SEX GROUPING

(Attachment 7-4)

TABLE I

MEANS OF 20 SOCIAL SKILLS

VARIABLES BY ECE COMPONENT, AGE, AND SEX GROUPING

Variable - Proportion[1] of time spent in:	ECE Comp.	Age	Sex Grouping			
			Male	Female	Mixed	All Sex Groups
1. Talking	PACKAGE	3	12.53	13.21	9.47	11.73
		4	31.35	16.00	12.72	20.02
		5	18.35	10.02	29.32	19.23
	TV-HV	3	8.76	19.95	10.86	13.19
		4	21.02	12.96	0.00	11.32
		5	15.30	9.50	17.05	13.95
2. Participating with group	PACKAGE	3	72.06	64.04	50.22	62.10
		4	81.22	68.91	63.87	71.33
		5	79.88	78.53	85.66	81.35
	TV-HV	3	53.02	69.45	40.93	54.46
		4	89.37	71.17	59.02	73.18
		5	80.68	71.08	70.50	74.08
3. Exploring situation	PACKAGE	3	3.95	1.10	1.35	2.13
		4	1.47	1.80	0.70	1.32
		5	2.71	1.05	2.20	1.98
	TV-HV	3	4.02	7.05	2.96	4.67
		4	3.77	1.46	0.92	2.05
		5	1.27	1.65	4.12	2.34
4. Showing need for security	PACKAGE	3	12.58	1.50	17.01	10.36
		4	6.40	8.31	0.15	4.95
		5	3.75	1.35	1.58	1.75
	TV-HV	3	3.72	22.00	48.57	24.76
		4	7.40	6.27	14.85	9.50
		5	5.47	1.81	3.27	3.51

[1] The proportions are given in percent.

TABLE 1 (CONT'D)

MEANS OF 20 SOCIAL SKILLS

VARIABLES BY ECE COMPONENT, AGE, AND SEX GROUPING

Variable - Proportion[1] of time spent in:	ECE Comp.	Age	Sex Grouping: Male	Female	Mixed	All Sex Groups
5. Antagonistic activities	PACKAGE	3	0.83	3.08	0.11	1.34
		4	0.47	0.00	0.05	0.17
		5	0.51	0.00	2.80	1.10
	TV-HV	3	0.16	0.20	1.21	0.52
		4	0.82	0.30	0.00	0.37
		5	0.28	0.00	0.07	0.07
6. Withdrawing/ getting distracted	PACKAGE	3	15.28	2.23	17.16	11.55
		4	4.70	8.60	0.85	7.26
		5	2.95	1.91	2.54	2.46
	TV-HV	3	7.15	14.40	49.56	23.70
		4	3.85	5.81	15.78	8.48
		5	5.59	1.65	6.38	4.54
7. Initiating antagonistic behavior	PACKAGE	3	0.65	2.10	0.09	0.94
		4	0.48	0.00	0.05	0.17
		5	0.40	0.00	0.26	0.22
	TV-HV	3	0.00	0.25	0.56	0.27
		4	0.10	0.08	0.00	0.06
		5	0.31	0.00	0.15	0.15
8. Refusing help	PACKAGE	3	0.07	0.00	0.00	0.02
		4	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00
	TV-HV	3	0.00	0.03	0.00	0.11
		4	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00

[1] The proportions are given in percent.

TABLE 1 (CONT'D)

MEANS OF 20 SOCIAL SKILLS

VARIABLES BY ECE COMPONENT, AGE, AND SEX GROUPING

Variable - Proportion[1] of time spent in:	ECE Comp.	Age	Sex Grouping: Male	Female	Mixed	All Sex Groups
9. Responding with antagonism	PACKAGE	3	0.20	1.07	0.03	0.43
		4	0.00	0.00	0.00	0.00
		5	0.10	0.00	2.60	0.90
	TV-HV	3	0.00	0.03	0.64	0.22
		4	0.70	0.23	0.00	0.31
		5	0.00	0.00	0.00	0.00
10. Working alone/ leaving work	PACKAGE	3	12.68	33.76	32.61	26.35
		4	14.08	29.18	35.95	26.40
		5	17.13	17.46	11.82	15.47
	TV-HV	3	44.80	23.73	9.53	26.02
		4	6.75	21.85	25.20	17.93
		5	13.71	27.27	23.10	21.36
11. Quiet participation/nonverbal enthusiasm	PACKAGE	3	53.60	46.20	35.21	45.00
		4	42.60	39.85	42.93	41.79
		5	55.10	65.49	49.08	56.55
	TV-HV	3	46.10	36.02	24.90	35.67
		4	58.75	53.39	58.63	56.92
		5	58.16	55.73	47.38	53.75
12. Initiating constructive behavior	PACKAGE	3	12.43	10.84	6.34	9.87
		4	23.10	13.75	10.95	15.93
		5	13.02	9.23	20.84	14.36
	TV-HV	3	0.35	16.27	7.24	7.95
		4	11.65	9.64	0.08	7.12
		5	12.01	6.83	14.65	11.16

[1] The proportions are given in percent.

TABLE 1 (CONT'D)

MEANS OF 20 SOCIAL SKILLS

VARIABLES BY ECE COMPONENT, AGE, AND SEX GROUPING

Variable - Proportion[1] of time spent in:	ECE Comp.	Age	Sex Grouping			
			Male	Female	Mixed	All Sex Groups
13. Asking questions/requesting help	PACKAGE	3	1.43	0.39	1.97	1.26
		4	5.15	1.83	1.05	2.67
		5	3.17	0.67	2.94	2.26
	TV-HV	3	0.23	1.15	1.41	0.93
		4	6.73	1.73	0.00	3.31
		5	1.46	1.40	1.80	1.55
14. Responding constructively	PACKAGE	3	2.52	2.64	6.44	3.86
		4	9.33	6.32	7.77	7.80
		5	7.65	4.84	9.20	7.23
	TV-HV	3	1.25	5.72	5.76	4.24
		4	10.90	6.93	0.00	7.86
		5	8.10	6.87	6.03	7.00
15. Giving help	PACKAGE	3	0.75	0.27	0.09	0.37
		4	0.30	0.13	0.00	0.31
		5	0.23	0.14	0.50	0.29
	TV-HV	3	0.00	2.48	0.16	0.88
		4	0.15	0.28	0.00	0.14
		5	0.27	0.12	0.23	0.20
16. (F-F) Transition	PACKAGE	3	92.55	89.41	77.01	86.32
		4	93.60	87.15	90.27	90.34
		5	91.42	92.20	94.20	92.60
	TV-HV	3	68.88	88.43	55.93	71.08
		4	94.95	88.36	92.98	92.09
		5	93.14	90.08	89.50	90.90

[1] The proportions are given in percent.

TABLE 1 (CONT'D)

MEANS OF 20 SOCIAL SKILLS

VARIABLES BY ECE COMPONENT, AGE, AND SEX GROUPING

Variable - Proportion[1] of time spent in:	ECE Comp.	Age	Sex Grouping			
			Male	Female	Mixed	All Sex Groups
17. (NF-F) Transition	PACKAGE	3	20.27	20.70	21.34	20.77
		4	26.55	22.50	32.35	27.13
		5	33.87	33.64	30.00	32.50
	TV-HV	3	9.93	25.68	23.13	19.58
		4	49.63	28.40	17.90	31.97
		5	40.10	22.47	24.23	28.93
18. (NF-NF) Transition	PACKAGE	3	79.27	78.03	77.90	78.40
		4	65.33	76.48	67.10	69.63
		5	64.40	63.51	69.10	65.67
	TV-HV	3	88.80	73.42	76.08	79.43
		4	60.13	71.73	83.13	71.66
		5	60.11	76.53	74.35	70.33
19. (F-NF) Transition	PACKAGE	3	8.57	8.54	8.90	8.67
		4	6.75	12.77	9.35	9.62
		5	8.48	7.81	5.44	7.24
	TV-HV	3	31.33	11.43	7.05	16.60
		4	5.00	11.51	6.30	7.60
		5	6.67	9.83	10.53	9.01
20. Transition from "isolation" to participation	PACKAGE	3	21.72	13.67	17.24	17.54
		4	11.78	16.90	16.12	14.93
		5	22.98	22.43	19.40	21.60
	TV-HV	3	5.08	18.50	5.04	15.69
		4	18.45	18.94	17.43	18.27
		5	28.64	19.18	18.80	22.20

[1] The proportions are given in percent.

TABLE II

MEANS[1] OF SOCIAL SKILLS VARIABLES BY

ECE COMPONENT AND AGE (SEX GROUPINGS COMBINED)

Variable	ECE Component	Age 3	Age 4	Age 5	All Ages
1. Talking	Package	11.73	20.02	19.23	16.99
	TV-HV	13.19	11.32	13.95	12.82
2. Participating with group	Package	62.10	71.33	81.35	71.59
	TV-HV	54.46	73.18	74.08	67.24
3. Exploring situation	Package	2.13	1.32	1.98	1.81
	TV-HV	4.67	2.05	2.34	3.02
4. Showing need for security	Package	10.36	4.95	1.75	5.69
	TV-HV	24.76	9.50	3.51	12.59
5. Antagnostic activities	Package	1.34	0.17	1.10	0.87
	TV-HV	0.52	0.37	0.07	0.32
6. Withdrawing/getting distracted	Package	11.55	7.26	2.46	7.09
	TV-HV	23.70	8.48	4.54	12.24
7. Initiating antagnostic activities	Package	0.94	0.17	0.22	0.44
	TV-HV	0.27	0.06	0.15	0.16
8. Refusing help	Package	0.02	0.00	0.00	0.00
	TV-HV	0.11	0.00	0.00	0.03
9. Responding with antagonism	Package	0.43	0.00	0.90	0.44
	TV-HV	0.22	0.31	0.00	0.17
10. Working alone/leaving work	Package	26.35	26.40	15.47	22.74
	TV-HV	26.02	17.93	21.36	21.77

[1]Means of the proportion of time (expressed in percent) spent in the activity designated by the variable name. Means are unweighted.

(Attachment 7-4)

TABLE II (CONT'D)

MEANS[1] OF SOCIAL SKILLS VARIABLES BY

ECE COMPONENT AND AGE (SEX GROUPINGS COMBINED)

Variable	ECE Component	Age 3	Age 4	Age 5	All Ages
11. Quiet participation, verbal enthusiasm	Package	45.00	41.79	56.55	47.78
	TV-HV	35.67	56.92	53.75	48.78
12. Initiating constructive behavior	Package	9.87	15.93	14.36	13.38
	TV-HV	7.97	7.12	11.16	8.75
13. Asking questions/requesting help	Package	1.26	2.67	2.26	6.19
	TV-HV	0.93	3.31	1.55	1.93
14. Responding constructively	Package	3.86	7.80	7.23	6.29
	TV-HV	4.24	7.86	7.00	6.36
15. Giving help	Package	0.37	0.31	0.29	0.32
	TV-HV	0.88	0.14	0.20	0.40

[1]Means of the proportion of time (expressed in percent) spent in the activity designated by the variable name. Means are unweighted.